The macrofinancial turn in central banking: Money market changes and Federal Reserve policy after the global financial crisis

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<th>Full Form</th>
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<tbody>
<tr>
<td>AE</td>
<td>Advanced Economy</td>
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<tr>
<td>AIG</td>
<td>American International Group</td>
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<tr>
<td>BIS</td>
<td>Bank for International Settlements</td>
</tr>
<tr>
<td>CARES Act</td>
<td>Coronavirus Aid, Relief, and Economic Security Act</td>
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<tr>
<td>CCP</td>
<td>Central Counterparty Clearinghouse</td>
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<tr>
<td>CD</td>
<td>Certificate of Deposit</td>
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<tr>
<td>CHIPS</td>
<td>Clearing House Interbank Payment System</td>
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<tr>
<td>CIP</td>
<td>Covered Interest Parity</td>
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<tr>
<td>CLAR</td>
<td>Comprehensive Liquidity Assessment and Review</td>
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<tr>
<td>CLO</td>
<td>Collateralised Loan Obligation</td>
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<tr>
<td>CP</td>
<td>Commercial Paper</td>
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<tr>
<td>CPFF</td>
<td>Commercial Paper Funding Facility</td>
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<tr>
<td>DTCC</td>
<td>Depository Trust &amp; Clearing Corporation</td>
</tr>
<tr>
<td>ECB</td>
<td>European Central Bank</td>
</tr>
<tr>
<td>EME</td>
<td>Emerging Market Economy</td>
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<tr>
<td>ETF</td>
<td>Exchange Traded Fund</td>
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<tr>
<td>FDIC</td>
<td>Federal Deposit Insurance Corporation</td>
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<tr>
<td>FHLB</td>
<td>Federal Home Loan Bank</td>
</tr>
<tr>
<td>FICC</td>
<td>Fixed Income Clearing Corporation</td>
</tr>
<tr>
<td>FIMA repo facility</td>
<td>Foreign International Monetary Authorities Repo facility</td>
</tr>
<tr>
<td>FOMC</td>
<td>Federal Open Market Committee</td>
</tr>
<tr>
<td>FRBNY</td>
<td>Federal Reserve Bank of New York</td>
</tr>
<tr>
<td>FSB</td>
<td>Financial Stability Board</td>
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<tr>
<td>FSOC</td>
<td>Financial Stability Oversight Council</td>
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<tr>
<td>FX swap</td>
<td>Foreign Exchange Swap</td>
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<tr>
<td>GC repo</td>
<td>General Collateral Repurchase Agreement</td>
</tr>
<tr>
<td>GSE</td>
<td>Government Sponsored Enterprise</td>
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<tr>
<td>GSIB</td>
<td>Global systemically important banks</td>
</tr>
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<td>HQLA</td>
<td>High Quality Liquid Assets</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>IOER</td>
<td>Interest on Excess Reserves</td>
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<tr>
<td>LCR</td>
<td>Liquidity Coverage Ratio</td>
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<tr>
<td>LIBOR</td>
<td>London Interbank Offered Rate</td>
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<td>LIC</td>
<td>Low Income Country</td>
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<tr>
<td>LTCM</td>
<td>Long Term Capital Management</td>
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<tr>
<td>MBS</td>
<td>Mortgage-Backed Securities</td>
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<tr>
<td>MLF</td>
<td>Municipal Lending Facility</td>
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<tr>
<td>MMF</td>
<td>Money Market Fund</td>
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<tr>
<td>MMFLF</td>
<td>Money Market Fund Lending Facility</td>
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<tr>
<td>MNE</td>
<td>Multinational Enterprise</td>
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<tr>
<td>MSLP</td>
<td>Main Street Lending Program</td>
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<td>OIS</td>
<td>Overnight Indexed Swap</td>
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<td>OMO</td>
<td>Open Market Operations</td>
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<tr>
<td>OPEC</td>
<td>Organization of the Petroleum Exporting Countries</td>
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<td>PDCF</td>
<td>Primary Dealer Credit Facility</td>
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<tr>
<td>PMCCF</td>
<td>Primary Market Corporate Credit Facility</td>
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<tr>
<td>PPPLF</td>
<td>Paycheck Protection Program Loan Facility</td>
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<tr>
<td>QE</td>
<td>Quantitative Easing</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>RLAP</td>
<td>Resolution Liquidity Adequacy and Positioning</td>
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<td>RRP facility</td>
<td>Reverse Repurchase Facility</td>
</tr>
<tr>
<td>RTGS</td>
<td>Real Time Gross Settlement</td>
</tr>
<tr>
<td>SEC</td>
<td>Securities and Exchange Commission</td>
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<tr>
<td>SLR</td>
<td>Supplementary Leverage Ratio</td>
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<tr>
<td>SMCCF</td>
<td>Secondary Market Corporate Credit Facility</td>
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<td>SRF</td>
<td>Standing Repo Facility</td>
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<tr>
<td>TALF</td>
<td>Term Asset-Backed Securities Loan Facility</td>
</tr>
<tr>
<td>TARP</td>
<td>Troubled Assets Relief Program</td>
</tr>
<tr>
<td>TCJA</td>
<td>Tax Cuts Jobs Act</td>
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<tr>
<td>TGA</td>
<td>Treasury General Account</td>
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<tr>
<td>TPR</td>
<td>Tri-Party Repo</td>
</tr>
<tr>
<td>TSLF</td>
<td>Term Securities Lending Facility</td>
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<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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Declaration

This thesis is entirely my own work and neither the thesis itself, nor any part thereof, has been submitted for examination at any other university. Some of the content of this thesis has been published in article format.

Parts of Chapter 3 have been published as:


Parts of Chapter 7 have been published as:

Abstract

Following the global financial crisis, the Federal Reserve has taken on broader responsibilities in macroeconomic management and financial stability policy. While the existing literature has tended to analyse these new functions separately, I bring them together at the level of money market strategy. To that end, the thesis analyses the impact of the Fed’s expanded money market footprint between 2008 and 2020. I show how questions of liquidity governance impart important shortcomings on the central bank’s overall money market strategy. As monetary policy, fiscal policy, and financial stability imperatives become increasingly entangled in the organisation of market liquidity, they impose conflicting demands on central bank policy that cannot be easily reconciled within existing policy frameworks. As the result of this impasse, the Federal Reserve has generally pursued a hands-off approach to complex policy issues, notably by relying on its market-accommodating rather than market-shaping capacities, or what is now increasingly called a de-risking strategy. In raising questions about potential contradictions built into the Fed’s macrofinancial policy framework, the thesis highlights the politics that inhere in the organisation of highly technical market interventions.

To explain the transformation of Fed policy, I draw on two conceptual developments. First, I employ a critical macrofinance lens to view the quintessential task of central banking not simply as reacting to changes in inflation with interest rate measures, but more broadly as ensuring a certain level of liquidity within the system. Analytically, this shifts the focus of attention away from the central bank’s role in affecting macroeconomic aggregates—such as inflation, employment, or growth—and towards a macrofinancial understanding of the interactions between central banks and private finance. Second, and drawing on this approach, I link transformations in market microstructure to macro-level transformations in central banking by analysing how central bankers problematise the role and governance of liquidity within financial markets. I show that while liquidity continues to be understood primarily as a technical question of ensuring stability within the financial system, the governance of liquidity entails highly political questions of market organisation that shape how policymakers navigate and negotiate the contradictions between various policy interests.
Chapter 1 – Introduction

In an article published in 1957, Hyman Minsky noted that the efficacy of central banking needs to be re-examined during ‘period[s] of rapid changes in the structure or the mode of functioning of financial markets’ (Minsky, 1957, p. 171). Writing after a period of prolonged financial repression had come to an end, Minsky was witnessing the beginning of a dramatic transformation in American finance. New credit instruments and trading practices were forging increasingly complex financial networks, foreshadowing the broader explosion in liquidity and liability management techniques that would transform the American and global financial system over the following decades. As Minsky noted, such rapid money market changes were bringing the problem of financial structure to the fore. During periods of relative calm, discussions of monetary policy can abstract from financial institutions and take the effectiveness of its operations for granted. By contrast, during times of rapid change, the ability of central bankers to affect the financial institutions and processes that exist within these markets diminishes, requiring a process of re-evaluation, experimentation, and adjustment.

Minsky’s warning that the actions of central banks need to be judged carefully against evolutionary changes in finance remains relevant today—indeed, it can be read as a foundational statement of a modern macrofinancial approach to central banking. In the United States, the global financial crisis of 2007-09 ended a period of relative calm, now commonly known as the ‘Great Moderation’ under Federal Reserve Chair Alan Greenspan. During the 1990s and the early 2000s, the prevailing monetary policy consensus placed price stability as the primary policy goal of the central bank. The primary purpose of such a closely proscribed mandate was to discourage discretionary policy: central bankers imagined that by credibly maintaining price stability they could ensure the orderly operation of finance without unduly interfering with the market (Bernanke et al., 2018). The global financial crisis exposed serious flaws in this worldview, forcing central bankers and regulators to confront complex and highly
fragile macrofinancial market structures and business models that disrupted financial markets and triggered unprecedented interventions on the part of monetary and fiscal authorities across advanced economies.

Following the crisis, the Federal Reserve has found it necessary to maintain a much larger footprint in markets, visible in its significantly expanded balance sheet. Far from governing ‘at a distance’ (Krippner, 2007), the Fed was suddenly deeply involved in a wide range of money market relationships and started to experiment with a series of ‘unconventional’ balance sheet policies to maintain control over financial and macroeconomic dynamics—most notably, large-scale asset purchases more commonly known as ‘Quantitative Easing’. At the same time, lawmakers conferred additional regulatory and supervisory powers to the central bank to help recognise and mitigate systemic risks within financial markets. Yet as new powers and modes of intervention revealed the exceptional power of central banks to shape markets, they have also triggered demands that central banks assume ever-more proactive roles, for instance with regard to distributive justice (Fontan et al., 2016), or in the transition to green finance (Dafermos et al., 2018). Others have perceived the growing role of central banks as dangerous overreach and a challenge to free market economics, leading to calls to ‘end the Fed’ (Paul, 2009). Faced with such politicisation, Federal Reserve officials have often expressed a desire to return to the pre-crisis institutional arrangement as the optimal way to conduct monetary policy—a wish that has proven impractical amidst the proliferation of new institutional configurations and entanglements that tie central banks to market practices (see Chapters 5 and 6 in this thesis).

This thesis sets out to analyse evolutionary dynamics in central banking practice and its relationship to money markets in the post-crisis period, drawing on the Federal Reserve as a case study. Following Minsky (1957), making sense of the transformation of central banking involves an understanding of how the central bank acts within markets: that is, it requires us to observe how practices of governing and market processes have become ever more entangled and aligned as policymakers and market actors with diverse interests seek to find ways to rely on and control specific financial instruments, structures, and dynamics. It is this insight that informs everything that appears subsequently in this thesis. Conceptually, this approach demands a shift in register. Scholarship working in and across comparative, institutional, and
international political economy has typically concerned itself with the political and macroeconomic consequences of central banks—their relationship to political and sectoral interests, and the resulting consequences for growth, inflation, and employment. By contrast, this thesis brings a political economy analysis to bear on the macrofinancial organisation of markets and their governance structures. This shift in register will be evident throughout the thesis and shapes my analysis in important ways. Simply put, rather than focusing on the role of outside ideas and interests in shaping macroeconomic outcomes, I analyse the struggle for power and control directly embedded within the market processes through which the central bank relates to money market participants. In line with Krippner’s (2007) observation that states increasingly govern through financial markets, I seek to understand more clearly how the central bank operates at the very centre of financial markets, and how interactions with private financial markets inform the evolving norms of monetary and financial stability policy.

Based on this approach, the governance of ‘liquidity’ emerges as a key theme across this thesis; in fact, the thesis itself can be understood as a study of central bank management of liquidity dynamics. Long considered a highly amorphous and ambiguous concept, liquidity had not featured prominently on the radar of economic policymakers before the crisis. Difficult to formalise within the conventions of economics, the tacit assumption was that the role of the state in governing liquidity could safely be reduced to backstopping and accommodating the financial system in times of crisis. Accordingly, central bankers have long relied on their ability to contain liquidity crises ex post (Özgöde, 2021). Observing such practices, political economists have tended to interpret the crisis-induced focus on liquidity as a smokescreen that legitimises far-reaching interventions in the service of financial interests while distracting from the more substantive vulnerabilities and inequities of the financial system (Langley, 2014). Yet arguably the global financial crisis and its aftermath brought liquidity to the fore not just as an explanation of crisis, but as an increasingly contentious problem within the governance of the monetary system itself.

As the Federal Reserve’s money market footprint expanded dramatically, access to liquidity came to depend not just on the complex business models and market making activities of private finance, but on the balance sheet operations of the Fed itself: innovative new forms of asset purchases, interest rate policy, last resort interventions,
and financial stability regulation all rely on the capacity of the central bank to make the balance sheets of financial actors more or less liquid, oftentimes imposing conflicting demands on the Federal Reserve. Observing such changes, this thesis addresses three closely related questions: first, how does the Federal Reserve establish and maintain control over contemporary money market dynamics? Second, what contradictions arise from post-crisis changes in the relationship between monetary, fiscal, and financial stability policy, and how has the Federal Reserve responded to these challenges? Third, how have these changes in central banking practice affected the Federal Reserve’s crisis intervention capacity?

The remainder of this introduction proceeds as follows. The first section argues that political economy scholarship continues to analytically privilege the macroeconomic rather than the macrofinancial consequences of central banking. On that basis, section two presents the analytical framework and key theoretical concepts that underpin this thesis, followed by methodological remarks on case selection and data sources in section three. Section four outlines the key contributions of this thesis, and section five concludes by briefly outlining the content of the individual chapters.

1.1. Studying the macrofinancial turn

What does it mean to study the macrofinancial turn in central banking? It is now widely accepted that the global financial crisis presented a shock to central banking, as established policy frameworks led practitioners not only to miss the oncoming crisis but also to misdiagnose the nature of the very problem they were meant to address (Christophers et al., 2017; Davies & Green, 2010; C. Goodhart et al., 2014; Siklos, 2017; Stiglitz, 2010; Tooze, 2018). As practitioners quickly came to recognise, conventional macroeconomic categories were of limited use in making sense of the dense and highly interconnected networks of (shadow) banking actors and practices that embedded systemic risks within the financial system. Since the crisis, central bankers and regulators have therefore been experimenting with different ideas aimed at helping them come to terms with the rapid changes in the financial system (Baker, 2013; Ban et al., 2016; Thiemann, 2018). One set of new practices has come under the heading of ‘macrofinance’, reflecting the ambition to bring technocratic expertise up
to date with an evolving economy shaped by a complex set of increasingly transnational and market-based banking and shadow banking activities (Adrian & Shin, 2010; Avdjiev et al., 2016; Borio, 2009; Pozsar, 2014; Shin, 2012).

Originally proposed within the centres of global monetary policy expertise, such as the New York Fed and the Bank for International Settlements, the macrofinancial perspective underpins the new banking regulations of Basel III and other ‘macroprudential’ reform projects that address the problem of systemic risk. Unlike traditional macroeconomic analysis, macrofinance looks not at the national accounting between countries, but at gross payment flows within global banking itself (Obstfeld, 2012; Shin, 2012): its starting point is that as one economic agent’s assets are another’s liabilities, banks and other financial intermediaries are operating within a complex and constantly evolving matrix of interlocking payment relations (cf. Tooze, 2018, p. 12). By focusing on these financial relations directly, the macrofinancial approach seeks to spot financial fragilities and leveraged positions that contributed to the pro-cyclical build-up of monetary imbalances, and that had previously escaped regulatory scrutiny.

Despite the novelty of the approach, political economy analysis has struggled to adequately capture the macrofinancial turn in central banking. With its emphasis on financial stability risks, the insights of macrofinance are not easily squared with the broader politics of central banking that are typically conceived around the distributional effects of monetary policy. Political economy scholarship has traditionally focused on the political and macroeconomic effects of central banks: for instance, studies have zoomed in on questions of democratic accountability and legitimacy (Abolafia, 2012; Adolph, 2013; Goodman, 1991; Quaglia, 2005), scrutinising the relationship between central bankers and elected officials (Binder & Spindel, 2017; Conti-Brown, 2016), as well as the ways in which sectoral, well-organised capital interests shape central bank policy (Bowman et al., 2012; L. Jacobs & King, 2017). As historical institutional and comparative scholarship has shown, central banks played a key role in the macroeconomic transition from post-war Keynesianism to financialised capitalism (Blyth, 2002; Hall, 1989; Hay, 2018), most notably by enshrining a governing logic which prioritised the politics of low inflation over full employment, entrenched unequal power relations between capital and labour, and enabled the shift to monetary governance premised on easy credit and political complacency regarding the risks of excessive financial growth (Best, 2018;
McNamara, 2002; Polillo & Guillén, 2005; Watson, 2002). In this interpretation, the market-liberal turn in central banking is best understood as embedded within a broader political, electoral, and ideational struggle that restructured the public interest, fuelled the financialisation of the economy, and increased the role of finance in organising contemporary capitalism (Aglietta, 2018; Copley, 2022; Harvey, 2007; Krippner, 2011).

Viewed from the perspective of the public interest, political confrontation, and the balance of power between capital and labour, it is perhaps not surprising that the significance of the macrofinancial turn has eluded much political economy scholarship. While prompting changes within the technical conduct of central banking, macrofinance has done little to challenge the persistence of financial power after the global financial crisis, giving the impression of a ‘status quo crisis’ (Helleiner, 2014). While the crisis initially seemed to invalidate the consensus belief in the efficacy of free markets, economic orthodoxy quickly consolidated (Blyth, 2013a; Mirowski, 2013). Subsequently, the turn to austerity left fiscal actors either unwilling or unable to stimulate demand and conferred growing responsibilities on central banks in managing the economy, most notably through the turn to Quantitative Easing (Siklos, 2017; Tooze, 2018). Orthodoxy is also widely seen to have prevailed in questions of financial regulation, as far-reaching macroprudential reform proposals designed to curtail systemic risk were significantly watered down in the process of implementation. Far from de-financialising the economy in the public interest, post-crisis governance thus retained a ‘technocratic rationality’ as policymakers and regulators engaged in consensus-building (Abolafia, 2012; Fligstein et al., 2017; Marcussen, 2009), preferring incremental changes that could be reconciled with existing institutional cultures and economic models (Clift, 2018; Levingston, 2021; Moschella & Tsingou, 2013).

What then is the significance of the ‘macrofinancial turn’ for political economy scholarship? In analysing the lack of large-scale transformations in macroeconomic governance, the existing political economy literature has been highly successful in showing how specific interests and technocratic forms of governance have entrenched and defended the inequities of financialisation. Yet the focus on outside ideas, political interests, and/or administrative and bureaucratic structures also tends to distract from the more direct analysis of how modes of interaction between states, their central
banks, and the economy have changed. As a result, more intricate changes within the organisation of markets have remained largely obscured—that is, changes in the types of interactions between finance and public actors that take place at the level and according to the rules of financial markets. Even though policymakers continued to place great emphasis on their traditional mandates and responsibilities, the changing financial environment prompted subtle shifts within the technical conduct of central banking that changed the way in which central bankers sought to affect the financial institutions and processes that exist within financial markets. Just as macrofinance as a policy pursuit reflects a desire to come to terms with this evolving landscape, political economy scholarship should draw out the implications of this ‘macrofinancial turn’ for our understanding of the operation and distribution of profit, power, and state capacity within contemporary financialised capitalism.

As an incipient political economy of macrofinance or ‘critical macrofinance’ has shown (Dutta et al., 2020; Gabor, 2020), such an approach forces attention onto the concrete interventions and practices through which states and their central banks engage with private finance. The focus on how public actors act within markets—that is, how they become entangled in the production and validation of private market practices and liquid market structures—allows us to tell a powerful alternative story about the enduring prominence of central banking within modern macroeconomic government. As other studies have shown, states have long relied on markets as vehicles for the provision of social goods (Krippner, 2011; M. Prasad, 2012; Quinn, 2017). Turning markets into a viable infrastructure for economic policy has involved not a simple process of de-regulation, but rather the proliferation of regulatory and governance frameworks through which market structures have been reconfigured in line with policy directives (Braun & Gabor, 2020; Özgöde, 2021; Wansleben, 2020). From the perspective of critical macrofinance, then, making sense of changes in central banking requires us to look beyond broad questions of the public interest, and instead analyse how policy incentives and financial motives in organising economic and financial governance come to be closely aligned: most notably, it reveals seemingly technical concepts such as ‘liquidity’ as a crucial and highly political battleground in the organisation of public and private sector interests (Pape, 2020).

Critical macrofinance thus not only seeks to make sense of the ideational and institutional shift in central banking, but also establishes as issues of academic and
political importance questions of liquidity governance and financial plumbing—that is, the infrastructural arrangements that enable finance and underpin its workings. Drawing on heterodox monetary economics, notably in the tradition of Minsky and his modern interlocutors (e.g. Mehrling, 2011; Minsky, 1993; Neilson, 2019), as well as political economy scholarship on shadow banking and market-based banking (Hardie et al., 2013; Lysandrou & Nesvetailova, 2015; Murau, 2017; Sgambati, 2019), critical macrofinance seizes upon the categories and modes of inquiry created by the macrofinancial policy literature to provide a novel perspective into the changes within the organisation of financial markets and monetary governance. Reflecting its origins in the aftermath of the global financial crisis, critical macrofinance research has analysed how the transformation of monetary governance has fostered instabilities within shadow banking (Braun, 2020; Gabor, 2016; Thiemann, 2014), and how central banks have subsequently expanded their emergency lending operations to cover an ever-broader swath of vital market infrastructures, moving from traditional lenders of last resort to ‘dealers’ or market makers of last resort (Mehrling, 2011; Murau, 2017; Musthaq, 2021; Pape, 2022; Tooze, 2018).

Yet while the emerging literature on critical macrofinance has done much to illuminate the drivers of such transformations and their implications for our understanding of financial markets, there has been a tendency to view changes in central bank operating procedures in relative isolation from the broader transformation of the state within financialised capitalism. As a result, the transformations of emergency lending, monetary policy practice, or financial stability regulation have largely been discussed separately, leaving unanswered important questions of how changes across these policy fields come together at the level of money market strategy. This omission is puzzling given that as central banks have taken on more responsibilities in the wake of the crisis, they are increasingly confronted with complex governance challenges that cannot be subsumed under the traditional responsibilities of monetary policy alone: aligning policy practices with complex market-based banking structures requires central banks to recognise the inherently entangled nature of modern monetary governance. As I will argue in the next section that outlines my approach, critical macrofinance should therefore treat liquidity not as a simple stability problem, but rather as a highly political question of market organisation.
1.2. Analytical framework

This thesis, then, seeks to provide a novel critical macrofinance approach to understanding the transformation of the Federal Reserve after the global financial crisis. At first glance, there appears to be a puzzling disconnect between the ‘status quo’ narrative that has become broadly accepted, and the complex array of new central banking tools and intervention techniques that emerged during and after the crisis. As I have argued above, it is certainly possible and viable to see technocratic crisis responses as geared towards sustaining and supporting the existing distribution of power in society. Yet such big-picture observations also black box the processes of monetary governance; they obscure how developments within the technical conduct of central banking itself can generate important and unintended changes in financial governance over the medium to long term.

To grasp the importance of these changes for monetary governance, I employ a critical macrofinance approach. As described above, this approach views central banks not primarily as administrative bodies, concerned with questions of mandate, authority, ideology, and bureaucratic capacity (though these aspects certainly remain important), but as market-based actors (Braun, 2020; Gabor, 2020). As such, critical macrofinance digs down to the ‘inner workings’ of monetary governance, analysing the complex patterns of connections that shape the interactions of central banks and private finance within markets. As I explain below in more detail, the focus on market practices allows me to highlight two key aspects of financial markets. First, financial markets are characterised by an essential public/private hybridity, as public and private actors are always entangled in markets and rely on each other in their everyday operations. This makes changes to the way in which states and their central banks position themselves in relation to financial markets highly consequential. Second, these entanglements point towards the role of liquidity as an important fault line of monetary governance. How the interactions between private finance and public actors shape liquidity conditions has important implications for how finance operates, how state policy evolves, and which (financial) actors win in importance over time.

Yet while critical macrofinance offers a useful lens for making sense of the interrelationships between market actors and policy, by itself it does not provide the conceptual tools to explain why certain changes take place—that is, it insufficiently articulates how changes in market microstructure are linked to macro-level
transformations in the organisation of central banking. Part of this shortcoming is that despite recognising the importance of liquidity for market organisation, current critical macrofinance scholarship offers little insight into how liquidity is approached as an object of governance itself. Liquidity continues to be primarily understood as a technical question of ensuring stability within the financial system, rather than a highly political problem of market organisation. As a result, there is very little understanding of how the liquidity interventions of various policymakers—central banks, fiscal authorities, and financial regulators—come together at the level of the money markets that serve as the crucial transmission mechanism for modern economic policy. What is missing, in other words, is a proper understanding of how various policy interests interact, and how policymakers navigate and negotiate difficult trade-offs that result from such interactions.

To address this missing link between micro-level changes and macro-level transformations, I pay attention to meso-level changes in policy processes themselves. Drawing on Foucault’s (1984) idea of ‘problematisations’, I employ a topological approach to reconstruct how conflicting and competing ideas about policy mandates and market implementation techniques have prompted central bankers to problematise existing modalities of liquidity governance and have led them to adapt and repurpose existing practices and tools of interventions to align their conduct with current market practices. In short, I seek to link transformations in market microstructure to macro-level transformations in central banking by analysing more concretely how central bankers problematise the role and governance of liquidity within financial markets. As this approach shapes the empirical investigation in the individual chapters, I will outline it in more detail below.

The first important feature of the critical macrofinance approach is that in its recognition of central banks as market-based actors, it shifts attention to the organisation of money markets and the payment relations that underpin them. Money markets are of critical importance due to their centrality to the dynamics of the financial system (e.g. Gabor, 2016; Mehrling, 2011; Sissoko, 2019; Wansleben, 2020). As wholesale markets for short-term debt securities, these markets serve important functions in the management of financial actors’ liquidity needs. At the core of the money markets are a set of financial actors (e.g. banks, dealers, money market funds) that serve as market makers within and across sovereign, secured, and unsecured
money markets by engaging in wholesale borrowing/lending operations (Stigum & Crescenzi, 2007). Typically, these actors lend their cash balances to each other (or the central bank) and fund themselves by issuing short-term tradable liabilities or by pledging securities in repurchase agreements, giving rise to a matrix of interlocking payment obligations. By paying close attention to evolutionary changes within these activities, critical macrofinance helps shed a light on the increasingly market-based nature of banking and finance more broadly (Hardie et al., 2013; Sgambati, 2019). Yet the emergence of new practices should not be understood as the consequence of financial market activity alone, but rather as the outcome of historically contingent interactions of the state with finance. Here, critical macrofinance offers important analytical tools by pointing to the public/private hybridity and the hierarchical character of finance. Liquidity is a systemic question: how states and their central banks try to govern money and through which mechanisms they situate themselves in relation to economic activity influences both how finance operates and how modern statecraft evolves (Giannini, 2011; Knafo, 2013; Ugolini, 2017). A key example of this hybridity can be found in the state’s role in the construction of credit money claims: through their central banks, states can accommodate and underwrite privately issued liabilities, for instance through emergency lending facilities that backstop the system in moments of crisis (Awrey, 2017; Hockett & Omarova, 2016; Pistor, 2013). In deciding what claims to underwrite, central banks lend credibility to certain forms of credit, and thereby codify a hierarchy amongst credit instruments within the payments system (Aglietta, 2018; Mehrling, 2012). Transformations in the institutional practices of central banking thus can have systemic effects on liquidity conditions within markets, giving rise to shifts in the macrofinancial architecture of finance more broadly.

The organic links between the institution responsible for governing money (the central bank), the state as regulatory and executive authority, and the broader financial markets in which they interact raises broader questions not just about the power of finance (Braun & Gabor, 2020), but also about the way in which the sometimes-conflicting demands of monetary policy, fiscal policy, and financial stability policy are negotiated in the engagement with market actors. Within the existing literature, such questions have been primarily discussed not at the level of markets—i.e. at the level of policy implementation—but at the level of ideational and organisational
change, for instance in terms of how central banks shape the evolution of financial stability mandates (Ban et al., 2016; Lombardi & Moschella, 2017). By contrast, focusing on conflicts of interest at the level of markets requires an understanding of how markets become ‘governable’ in the first place: that is, how policymakers develop the precise strategies and techniques of intervention that allow them to govern successfully through markets, and find ways of aligning their own objectives with evolving market structures.

The focus on alignment prompts us to understand policy change not merely at the ideational level but also to consider its ‘material’ (MacKenzie, 2017) and operative linkages to the financial system. Given the evolutionary character of finance as described above, finding and maintaining forms of governability over market processes requires a process of reflexive contestation and adjustment—something not dissimilar to what Foucault described with his concept of problematisation. Emerging in his later work, Foucault’s (1984) concept of problematisation asks us to analyse the ways in which problems are abstracted and rendered intelligible, so that they can be addressed through specific solutions. In Foucault’s reading, problematisation thereby describes a process through which existing forms of understanding or techniques of governance are taken up and recombined or redeployed to new situations and problems. This approach diverges from Foucault’s earlier work in important ways, most notably by treating ‘thinking not as an “anonymous, discursive thing” but as a “dynamic and heterogenous process” of critical reflection and intervention’ (Collier, 2009, p. 95).

Making sense of such reflexive moments of contestation and questioning requires a ‘topological’ approach that maps the ‘patterns of correlation’ in which various techniques of governance, institutional arrangements, and procedures are configured and transformed (Collier, 2009). Two features of this approach are particularly notable. First, it shifts attention to the role of policy actors, including those economists employed within central banks and other centres of policymaking. Political economy scholarship has often paid significant attention to outside forces and large ‘l’ ideas, such as Keynesianism or monetarism (Blyth, 2002; Hall, 1989). The basic assumption here is that economic ideas shape how the economy is governed. While there is some truth to this assumption, the focus on the processes of governance and their problematisation requires us to think more concretely about how economists outside
of academia operate—what Callon (1998) calls ‘economists in the wild’. Research output and policy programmes that stem from within institutions of governance often do not follow pure academic theory but skirt greyer, non-pure forms of economic arguments, as such ‘policy economists’ apply arguments to practical problems of governance and seek to reconcile new approaches with existing ideas as well as institutional structures (cf. Clift, 2018; Eyal & Levy, 2013).

The second feature of such a reiterative problem-solving approach (Haydu, 1998) is that it allows us to analyse situations of upheaval, when existing knowledge loses its coherence and its analytical purchase in addressing specific problems. The resulting process of policy adaptation, problematisation, and experimentation bears some similarities to Peter Hall’s (1993) seminal work on policymaking as a process of social learning. The idea of problematisation best responds to Hall’s second or third order shifts in policymaking. Whereas second order shifts refer to major changes in techniques and tactics within an established paradigm, third order change occurs when one paradigm replaces another. Yet while Hall conceives of such shifts as tectonic in nature, the perspective advanced here emphasises mutational transformations, in which various approaches to governance can coexist and complement each other in unexpected ways as policymakers respond to different political, institutional, social, and economic contexts. The method of problematisations thus allows us to approach social learning without overstating the effects of punctuated change and without overlooking continuities in governance frameworks (cf. Clift, 2020).

The method of problematisation has found application in recent work on global financial (crisis) governance (e.g. Best, 2014; Langley, 2014). Paul Langley for instance has relied on problematisation to show how the global financial crisis was rendered governable by making it intelligible as a variety of discrete technical problems that each required a dedicated and unique policy response. One aspect of this was to reiteratively name and act on the crisis as one of ‘liquidity’, thus configuring a particular form of crisis response aimed at restoring the circulation of credit within the economy while also pre-empting a broader reorganisation and contestation of financial behaviour. Yet where Langley sees ‘liquidity’ as the endpoint of a process of problematisation—a way of treating the crisis as a temporary blip in the otherwise efficient functioning of markets—I take the problem of liquidity as the very starting point of post-crisis governance.
As I argue, far from resolving the contradictions of financial governance, liquidity interventions and new and enduring forms of liquidity support acted to impose a set of new and sometimes conflicting demands on central banks that increasingly rendered traditional understandings of liquidity itself problematic. Policymakers and regulators often struggle to adequately address complex governmental challenges such as liquidity—especially when doing so would endanger the legitimacy of their tightly-circumscribed political mandates. Amidst such problems and potential dysfunctions in governance, central bankers have thus tended to revert to a more ‘hands off’ form of governance that places more emphasis on their ‘de-risking’ (Gabor, 2021b) and market-accommodating, rather than market-shaping capacities. Rather than simply recounting how policymakers have realigned their market-based interventions with evolving market structures, the thesis thus pays particular attention to the institutional and ideational obstacles that have at times prevented a broader realignment of governance functions within the state apparatus itself. It is on this basis that the problematisation of liquidity guides the inquiry in this thesis into the institutional transformation of money markets and central banking in the post-crisis period.

1.3. Case, methods, and data

In analysing changes in central banking and the macrofinancial architecture of finance after the global financial crisis, this thesis draws on the Federal Reserve as a case study. The Federal Reserve has been selected for two reasons. First, and given that the exploration of macrofinancial factors in market-based governance is not very common in political economy, the breadth of existing studies on the Federal Reserve allows me to focus on highly technical dynamics and refer to the existing literature regarding the broader political, social, legal, and institutional context in which the Federal Reserve operates. Second, the Federal Reserve is a highly consequential institution given that today’s global financial system is dominated by the US dollar. Fed policy thus regularly affects markets outside of the United States; and vice versa, global market dynamics can have direct consequences for US market dynamics. Making sense of these interactions at the very heart of the global financial system allows me to analyse the way in which trans-nationalised, macrofinancial dynamics disrupt traditional
macroeconomic governance, and shed new light on the relationship between Federal Reserve policy and global markets.

The study relies on four sources of data. The first source is descriptive statistics that allow me to capture the transformation of the Federal Reserve’s balance sheet and broader market dynamics. These include the Federal Reserve Economic Data (FRED) online database, DTCC Solutions, Bloomberg Professional Services, as well as data from the US Treasury, Office for Financial Research, the Securities and Exchange Commission, the Federal Financial Institutions Examination Council, the Bank for International Settlements, and the International Monetary Fund. The statistical data allows me to analyse the transformation of domestic and global US dollar markets over time.

Second, I draw on policy documents including annual and research reports from the Federal Reserve and other research and policy institutions such as the Bank for International Settlements, the International Monetary Fund, and the Financial Stability Board. Transcripts from the Federal Reserve’s Federal Open Market Committee (FOMC) have been particularly valuable in analysing the position of individual Fed Governors and Board members on various issues. As FOMC transcripts are released annually with a six-year delay, I have analysed transcripts and other historical materials up until the end of 2016. To contextualise current events further and accommodate for the unavailability of transcripts in more recent years, I have relied on data from financial news reporting, including the Financial Times, Bloomberg, the Wall Street Journal, and the New York Times.

Further, I have extensively consulted market research published not by public authorities but by private market participants from various banking and asset management companies. The ‘Global Money Notes’ series published by Zoltan Pozsar at Credit Suisse since May 2015 has been a particularly valuable source of fine-grained money market research. Unlike policy research published by public or international institutions, private sector research notes often do not conform to academic norms of citation, and tend to exhibit a mix of market analysis, investment advice, and policy recommendations. As these reports typically address extremely current events, some caveats must be applied. For instance, there is ample scope for misinterpretations or misdiagnosis of market dynamics. Further, these notes are written for investors and thus frame market developments in very specific ways. To gain a more complete
picture, I have thus triangulated private market research with policy output and expert interviews.

As a third data source, I have relied on expert interviews. Between June 2020 and February 2022, I have conducted 15 semi-structured interviews with different market actors, including research economists active in (global) regulatory institutions, central banks, private banks, as well as with academic economists that have cooperated with policy economists on research. Due to the impact of the Covid-19 pandemic, the interviews were all conducted online or via telephone. A complete list of anonymised interviews can be found in Appendix I. As communication plays a key role in modern markets, the interviewees tended to speak in measured ways, which at times has limited the ability of interviews to provide novel insights. At the same time, interviews proved helpful in pointing me towards research output and problematics that I had previously not been aware of. In the thesis, I have preferred to cite such public output whenever possible, rather than rely on anonymous statements.

Given the contemporary nature of my research, the interviews have focused primarily on the post-crisis period. For insights into the longer-term transformation of Federal Reserve policy, the Federal Reserve’s Oral History Interview series, conducted in connection with the Centennial anniversary of the Fed in 2013, have proven invaluable. The 57 interviews with former Fed Chairs, Vice Chairs, Governors, as well as former Fed staff have proven highly useful in understanding how perceptions of liquidity and payment risk have changed over the decades. Finally, I have relied on archival material to place recent changes in central banking into a broader historical context. Here, the Federal Reserve’s digital library FRASER has offered a wealth of historical data. To understand the motivations of specific officials, I have visited the Library of Congress in Washington, DC and the Rare Books and Manuscript Library at Columbia University in New York in September 2019. Further archival trips—planned from March to June 2020—were prevented by the onset of the Covid-19 pandemic. Given the incomplete nature of the archival work, I have shortened the timeframe of the historical material included in the thesis in favour of a more comprehensive discussion of post-crisis developments. As a result, I have primarily treated archival material as background information.
1.4. Contributions to the literature

This thesis makes several contributions both to the specialist literature on central banking and the broader political economy literature on economic and financial governance.

First, the thesis contributes to the study of monetary governance from a critical macrofinance perspective—both empirically and conceptually. The empirical contribution is to extend the study of central banking practices to the most recent era by analysing Federal Reserve policy after the global financial crisis. While political economy scholarship has analysed the consequences of various aspects of post-crisis governance, such as Quantitative Easing or the expansion of central bank financial stability mandates, the precise mechanisms through which the Federal Reserve acts within markets have remained relatively obscure. By focusing on concrete practices, I show how the Federal Reserve has adapted to the post-crisis market environment. The second contribution to critical macrofinance is conceptual: rather than studying Federal Reserve policy in isolation, I expand on existing critical macrofinance perspectives by bringing questions of monetary, fiscal, and financial stability management together at the level of money market strategy. By viewing market-based governance as an integrated whole, this innovation thus allows a tighter grip on evolving macrofinancial and macroeconomic governance regimes.

Second, my thesis yields several original insights that will contribute to the literature on financial governance more generally. Most significantly, the thesis highlights the role of liquidity as an important fault line of financial governance: how states position themselves in relation to financial actors has important implications for how financial markets operate, which actors gain in importance over time, and what trades they can conduct profitably. Attention to complex and often ignored problems of liquidity thus helps us understand better what is significant about new (market-based) financial practices, and how financial infrastructures and trading relationships evolve in relation to macroeconomic policy. By studying liquidity directly, I draw implications not just about the development of (market-based) finance but also reconceptualise monetary governance as a constant process of adaptation and alignment with evolving market structures. The key insight is that liquidity resists easy abstraction: it is a complex and entangled issue that affects various policy objectives that are articulated as separate goals (monetary policy, financial stability policy) yet remain deeply interlinked at the
level of market strategy. As the analysis of concrete governance techniques and practices in this thesis suggests, policymakers often struggle to adequately address liquidity issues within the confines of existing mandates. Amidst such problems and potential dysfunctions in governance, central bankers have tended to revert to a more ‘hands off’ form of governance that places more emphasis on their market-accommodating, rather than market-shaping capacities. The thesis thus locates problems of adequate policy coordination around interlinked problems of liquidity as one source of the emergence of a ‘de-risking state’.

Finally, the thesis also contributes to the broader political economy literature. The existing literature typically posits a functional relationship between the instability of credit circuits and state mechanisms of support for these circuits (last resort lending). By contrast, in de-linking liquidity from financial crisis, I approach liquidity as a more mundane, everyday activity that structures state-economy interactions, and influences the shape of policy as public actors seek to govern through increasingly financialised economic actors. This question of how liquidity shapes economic policy goes beyond narrow studies of central banking. As states govern through markets, liquidity becomes a key organising question that pervades important social questions such as debates about the green transition, the role of public institutions in shaping investment, and the potential for monetary policy to stabilise prices. Focusing on the way in which liquidity governance imposes sometimes conflicting demands on public actors thus offers a way to understand how potential trade-offs shape policy. Ultimately, such an approach can help to replace commonplace questions about optimal monetary policy with an analysis of the optimal macrofinancial framework more broadly, thereby opening up avenues for critical research into the implications of the current central bank-centric macroeconomic policy regime.

1.5. Chapter structure

The thesis is structured as follows. Chapters 2 and 3 review the literature and develop the conceptual apparatus of the thesis. Chapter 2 situates the recent macrofinancial turn within the broader political history of central banking, whereas Chapter 3 draws out the importance of liquidity for monetary governance, and its growing relevance in
the post-crisis period. Drawing on the approach developed in Chapter 3, Chapter 4 then offers a broad historical overview of the Fed’s money market strategy from the 1950s to the global financial crisis. Chapters 5-7 discuss the changing modalities of the Fed’s market-based governance in the post-crisis period. Chapter 5 first analyses how the Federal Reserve learned to govern money markets with a dramatically expanded balance sheet after the crisis. Chapter 6 describes the market effects of the Fed’s attempt to return to the monetary policy practices of the pre-crisis period from late 2015 onwards: it shows how efforts at policy ‘normalisation’ ran into trouble as pre-crisis forms of governance no longer aligned with post-crisis market practices. Building on the Fed’s experience with governing post-crisis markets through an enlarged balance sheet, Chapter 7 shows how the Fed responded to the first major financial shock since the global financial crisis—the Covid-19 pandemic beginning early 2020. Chapter 8 discusses implications of my analysis for political economy research and further avenues for studying central banking and macrofinancial policy frameworks.

Following this introduction, Chapter 2 situates the political economy literature of central banking within the twentieth-century transformation of macroeconomic governance itself. Whereas questions of financial stability and market structure played a key role in debates about central banking in the nineteenth century, the advent of modern macroeconomics between the 1920s and 1950s shifted the operational focus of central banking towards problems measurable by new macroeconomic statistics—notably questions of growth, inflation, and employment. Linking the politics of central banking to its macroeconomic effects has allowed political economy scholarship to develop highly insightful critiques of contemporary central banking, but it has also tended to obscure how more intricate changes in the technical conduct of central banking have altered the architecture of finance itself. As the global financial crisis showed, the macrofinancial structure of monetary governance can be highly consequential, prompting a series of innovations within central banking to maintain control over evolving financial processes and thereby preserve the capacity to govern the macroeconomy effectively.

To tease out the politics of the macrofinancial turn within central banking, Chapter 3 develops an approach to studying the processes of monetary governance as tied up with the problem of liquidity. Following the crisis, policy economists and regulators
became more aware of the complex role of liquidity within increasingly market-based financial systems. At the same time, policy economists have tended to view liquidity as a private market dynamic, and thereby tacitly reduced the role of the state to backstopping and accommodating the financial system in times of crisis. As I show, we can witness a similar dynamic in recent political economy scholarship in the tradition of Hyman Minsky. To re-politicise the question of monetary governance, I propose a focus on the organisation of liquidity governance itself. I suggest that the struggle for control over evolving financial dynamics is intimately tied up with the distribution of governance responsibilities between monetary policy, fiscal policy, and financial stability policy. As liquidity needs are growing more complex within markets, the existing division of labour between policy fields and the lack of coordination between them provides strong obstacles for effective financial and monetary governance and sustains the continued influence of financial interests. The resulting contradictions, experimentations, and adaptations in governance techniques and practices thus provide an important entry point for a critical macrofinance approach.

Chapter 4 provides a broad historical overview of the transformation of Federal Reserve policy since the 1950s. Sidestepping the conventional macroeconomic narrative, the chapter emphasises the practices through which the Fed relates to and acts through markets—that is, it focuses on the precise operative linkages through which policy interests and market structures have become aligned as the Fed emerged as a key macroeconomic actor. As I show, turning the monetary system into a viable infrastructure for economic governance required the Federal Reserve to problematise liquidity within an evolving market landscape, rearticulate modes of interventions, and develop mechanisms to enlist financial practices as constitutive features in its monetary governance regime. Yet the extensive reliance on markets also created an important contradiction at the heart of monetary governance: for markets to function effectively, the Fed found it necessary to prop up ever more intricate and interconnected market structures such as repo markets, which in turn threatened to create instability and volatility within financial markets. While central bankers and regulators long maintained faith in the ability of markets to operate efficiently with minimal interference, the global financial crisis revealed the limits of a ‘hands-off’ governance strategy.
Chapter 5 discusses the transformation of the Federal Reserve after the crisis. Following the crisis, the Fed’s balance sheet expanded dramatically, first due to emergency lending operations and subsequently through the adoption of Quantitative Easing—a development that was politically contested precisely because it expanded the Fed’s footprint in supposedly free and efficient markets and, by expanding base money, created widespread fears of inflation. Confronted with the politicisation of post-crisis central banking, Fed officials have been keen to demonstrate their political and operational independence and ‘normalise’ their monetary policy practices. Yet the exit from QE proved difficult: not only have asset purchases dramatically expanded bank reserve positions, forcing the Fed to develop new policy to maintain control over short-term money market rates; new macroprudential regulations designed to curtail systemic risk have also restructured money market activity in a fashion that ties financial practices much more closely to the Fed’s operations than before. In this context, the Fed met unexpected difficulties in disentangling its balance sheet and broader market operations from the liquidity demands of a diverse set of money market participants.

Chapter 6 analyses the market dynamics that would ultimately derail the Fed’s attempt at policy normalisation. To that end, the chapter traces the money market effects of the Fed, the US Treasury, and macroprudential regulation across three interlinked market segments: the FX swap market, the LIBOR market, and the domestic US repo market. I show that funding pressures migrated from the outer spheres of global dollar markets into the very heart of the US financial system between 2015 and 2019, culminating in an acute repo funding crunch in September 2019. The reason for this development was a clear lack of coordination between the imperatives of monetary policy, financial stability regulation, and the Treasury’s debt management practices during the process of ‘policy normalisation’, leading to a situation in which banks’ ability to serve as an elastic backstop for proliferating shadow banking actors and practices was progressively squeezed. The September 2019 repo episode thus marks an inflection point for Fed policy: if previously the Fed had sought to return to a ‘lean’ balance sheet, the repo crunch showed the need for a more proactive central bank backstop.

Chapter 7 discusses the Fed’s response to the Covid-19 pandemic as the institutional endpoint of a policy adjustment process that the Fed had embarked on in the post-
crisis period. While the effects of monetary-fiscal-financial policy initiatives had become increasingly misaligned and even outright dysfunctional in the years since the global financial crisis, concerns about the political mandate, legitimacy, and economic consequences of interventions had largely prevented a broader adjustment across these policy domains. When confronted with instability, the Fed had thus reverted to a market-accommodating, rather than market-shaping role. The pandemic response took this operative logic to the extreme: through large-scale interventions, the Fed blurred not just lines between monetary policy, fiscal policy, financial stability policy, and credit policy, but also between onshore markets and offshore dollar markets in the effort to backstop the functioning of private markets. When judged in terms of their ability to stabilise and backstop private finance, the Fed’s interventions were indisputably a success. Yet the market turmoil and the policy response also show that a broader set of questions about the macrofinancial architecture of US finance remains essentially unanswered. In stabilising and managing an increasingly market-based financial system, the pandemic thus pushed the Fed more forcefully into a comprehensive de-risking role across the (financial) economy yet without addressing the underlying tensions within the financial market structure itself.

Chapter 8 concludes by reflecting on the importance of a critical macrofinance perspective in the contemporary world in which inflation—and thereby macroeconomic themes—have made a dramatic return. I argue that a macrofinancial analysis helps us understand better how public interventions can shape an evolving financial structure. I outline key issues for further research, namely the evolution of collateral-intensive finance; the continued strength of the US dollar in global markets; and the growing de-risking role of central banks.
Economists have long tended to naturalise the development of central banking as a logical response to the needs of the market. In Charles Goodhart’s (1988) seminal work, The Evolution of Central Banks, modern central banking emerged as the response to new demands for money that gradually convinced the Bank of England to specialise in the provision of liquidity to the banking system. Public responsibility for social welfare organically grew out of the Bank’s closeness to the government, its control over much of the specie in the country, and its own business interests. After an initial period of trial and error, the Bank developed the modern function as lender of last resort: as formulated in Walter Bagehot’s influential Lombard Street (1873), in times of crisis a central bank should lend freely to solvent institutions, yet only against good collateral and at high interest rates. This would allow the central bank to stem a broader crisis of confidence and forestall a bank run. Soon to be considered the ‘gist of the art of central banking’ (Aglietta & Scialom, 2008, p. 4), last resort lending came to play an important role in the management of Britain’s money markets in the late nineteenth century (Bignon et al., 2012), and subsequently spread elsewhere.

By contrast, political economists and economic sociologists have emphasised that central banks are highly political institutions (Conti-Brown, 2016; Knafo, 2013; Konings, 2011; Krippner, 2011). As a key institution of economic governance, the role of the central bank is always closely tied to questions of power: modern states, their central banks, and the markets they operate in are historically contingent and politically produced. The money question—the issue of who controls the financial system and who wins and who loses as a result—has long shaped political debate and embedded the evolving functions of modern central banks within a historically specific socio-cultural context (D’arista, 1994; Livingston, 2018). From this perspective, the development of modern macroeconomic management owes much to the politicisation of money. Operative techniques of economic management, such as last resort interventions and open market operations, are directly derived from the
political struggle for control over financial relations (Knafo, 2013; Walter & Wansleben, 2020). Similarly, theoretical conceptions relating to the role and circulation of money and credit within the market have been instrumental in delineating the economy as a distinct object of intervention (Laidler, 1991).

As I argue in this chapter, the advent of modern macroeconomics has had a profound impact on central banking itself and on the ways in which it has been analysed in social science scholarship. Whereas earlier discussions had centred on the techniques and practices through which central banks stabilise and shape financial processes, by the mid-twentieth century the focus shifted to the economic consequences of central banks that were now measurable with newly developed statistical aggregates of inflation or employment (Hellwig, 2015). Associating particular economic outcomes with political or sectoral interests has allowed social scientists to politicise the distributional consequences of distinct central bank policy settings (Best, 2018; McNamara, 2002; Watson, 2002) and highlight the role of economic ideas in reshaping societal consensus around specific policy goals (Ban, 2016; Blyth, 2002; Hall, 1993). Yet the emphasis on the macroeconomic consequences of central banking has also led to a somewhat external understanding of central banks’ relationship to the market: by focusing on the political legitimacy and distributional consequences of central banking, political economists have tended to forego a closer examination of the precise processes of monetary governance that tie central banking to financial developments.

The global financial crisis showed the need to re-problematise the role of central banks in facilitating and sustaining speculative financial practices, most notably in the shadow banking sector (Braun, 2020; Gabor & Ban, 2016; Lysandrou & Nesvetailova, 2015; Sissoko, 2019; Tooze, 2018). It has thereby rekindled interest in the ‘macrofinancial’ linkages that shape the mutual evolution of state policy, central banking practices, and private (shadow) banking instruments. This thesis speaks directly to this latter approach, as it allows us to understand more clearly how various policy objectives are shaped at the level of markets through their interactions with, and the struggle for control over, private actors. As I argue, making sense of these market-based processes—often obscured by grand macroeconomic narratives in the literature—opens up new avenues into studying the practices of central banking as inherently messy and conflictual. In moving from a political economy analysis shaped by macroeconomic objectives to one shaped by macrofinancial categories, the chapter
thus recentres the role of financial dynamics and creates the conceptual space needed to answer the research questions posed in this thesis—most notably, how to assess and interpret the Fed’s capacity to affect the money markets directly and rely on these markets as a viable transmission mechanism for economic policy.

Drawing on the history of the Federal Reserve, the remainder of this chapter is organised into three sections. The first one traces the role of money and central banking in giving shape to modern macroeconomic governance. Building on this insight, the second section shows how modern central banking has typically been analysed in terms of its macroeconomic consequences—most notably, in its role in facilitating the transition to financialised capitalism. The third section analyses the recent macrofinancial turn in central banking and asks whether the newfound emphasis on the messiness of financial stability and monetary policy processes allows new insights into the evolving shape of central banking—a question that is taken forward and elaborated on in the remainder of the thesis.

2.1. Central banking and the modern American state

The place of the central bank within economic management has always been precarious. Operating both within financial markets and as administrative state agency, central banks maintain a hybrid status that, ‘perched precariously between the state and the financial system’ (Braun, 2020, p. 397), defies modern expectations of what it means to be a public (or private) institution. It is this hybridity that fuels the politicisation of central banking: in balancing the public interest in stability with the money interest in profit, the role of the central bank within the payments system is necessarily contingent and politically contested. Unlike fiscal budget politics, which are typically understood to reside outside of the economy and affect the economic system through their input, the inside status of central banks has long fuelled suspicion that they simply operate as bulwarks of financial interests. As a result of this unique position, central banks and their relationship to finance has long been part of an intense political struggle for control.

During the nineteenth and early twentieth century, scrutiny of the gold standard and the functions of a central bank were front and centre in American politics (D'arista,
The issue that American reformers confronted was that the money supply was highly inelastic. Inelasticity was a problem for the highly seasonal demands of trade, a consequence of the largely agricultural character of the nation at the time. Bank reserves were typically too tight during harvest time, pushing up interest rates and attracting gold inflows from the more elastic international money market; or they were too loose, as banks put their excess liquidity to work in speculative New York stock market ventures. The result was seasonal change in credit conditions punctuated by financial crises in 1873, 1884, 1893, and 1907. Under these conditions, workers and especially farmers were intensely interested in the factors affecting the cost and availability of credit. Tapping into this sentiment, progressive populist forces saw the key issue as the limited quantity of currency in circulation. By advocating for a bimetallic standard that would place silver next to gold, reformers sought to stave off the deflationary tendencies of the gold standard and create alternative sources of liquidity. As Presidential Candidate William Jennings Bryant exclaimed at the 1896 Democratic Convention in a famous anti-banker speech, the country’s banking interests ‘shall not crucify mankind upon a cross of gold.’

Within the financial community, the key problem was understood to be not the quantity of currency as such, but rather the quality of credit claims outstanding (Mehrling, 1996). Drawing on the so-called Real Bills Doctrine, banking interests considered elastic credit expansion not inflationary if strictly issued for productive purposes, because the demand for money would be determined by real transactions. Short-term loans for commercial activity would be self-liquidating because the sale of goods bought with borrowed funds would immediately free up the money for the repayment of the loans (Arnon, 2011). This position was not directly antithetical to the quantity theory: the intention was to control the quantity of money indirectly by preserving the quality of money claims in circulation. This would allow the supply of money to be left to the ‘ordinary processes of competitive banking’ (Viner, 1937, p. 223). Whereas quantity theorists operated with a narrow understanding of ‘outside’ money or currency, Real Bills advocates had a broader understanding of money that included ‘inside’ credit: the crucial question was how to preserve the soundness of various bank credit claims in circulation.
As advocates of *laissez-faire* banking, Real Bills advocates were ambiguous about mechanisms of control over bank credit creation (Laidler, 1991). While the issue of bimetallism disappeared from American politics with Bryant’s defeat in the 1896 election, the problems of the American financial structure remained. Following the money panic of 1907, only mitigated by coordinated interventions of private bankers under the lead of J. P. Morgan, the problem of America’s missing central bank could no longer be ignored (Sprague, 1908). After several commissions on monetary reform, the Federal Reserve System was created in 1913 (Meltzer, 2003). Debate about the founding of the Federal Reserve centred on efforts to tame the power of New York financiers and of radical populist reformers alike. The Federal Reserve Act reflected the influence of proponents of the Real Bills Doctrine who advocated a laissez-faire approach that placed the discounting of self-liquidating commercial bills at the centre: by privileging commercial activity, this was seen as automatically limiting the power of speculative finance at Wall Street (Mehrling, 1997). At the same time, by following clearly laid-down rules for credit extension, it assuaged populist concerns about an activist central bank that would concentrate power within the hands of financial elites (Konings, 2011).

In practice, the compromise enshrined in the Federal Reserve Act meant that the newly minted central bank would not operate as a proficient lender of last resort, and nor would it fulfil a dynamic role in the management of the economy. The key problem was that at the time of the Federal Reserve’s creation, banking operations had already become significantly dissociated from the prescriptions of the Real Bills doctrine. At the heart of the Real Bills doctrine is a distinction between productive credit and speculative credit. In focusing on the legitimacy of the former, the Fed neglected the significance of the latter in shaping the American financial ecosystem. Unlike its British counterparts, American banks were deeply involved not just in the financing of working capital but also fixed capital, including bonds and stocks, as well as loans against real estate collateral (Eichengreen, 2015; Mehrling, 2011). As acute observers of the market analysed, the increase in the trading of financial products offered a wholly new form of liquidity: banking operations were not restricted to the self-liquidating properties of commercial loans (as envisioned by the Real Bills Doctrine), but instead could rely on the trading of financial products in secondary markets (Moulton, 1918, 1922). What supported the liquidity of the financial system, in other
words, was the ‘shiftability’ of assets via the underwriting of speculative intermediaries, such as security dealers and other investors willing to buy whatever banks were selling. By ignoring the liquidity needs of such speculative dealers, the Federal Reserve failed to intervene decisively during the banking crisis that followed the stock market crash in October 1929 (Mehrling, 2011).

Following the crash, the Federal Reserve saw significant changes to its organisation under New Deal legislation. Key changes were introduced by the Banking Act of 1933 and the subsequent Banking Act of 1935. Administratively, the new legislation centralised Fed power in Washington by creating the Federal Open Market Committee and replacing the highly federalist Federal Reserve Board with the Board of Governors in its current form (Conti-Brown, 2016). Economically, the 1935 Act gave the Fed the power to discount any ‘sound’ asset, not just commercial loans. As such, it offered a strong repudiation of the Real Bills Doctrine and the idea of self-liquidating loans, and established the Federal Reserve more firmly as lender of last resort for the American banking system (Nelson, 2017; Sandilands, 1990).

The reorganisation of central banking after the Depression was part of a larger transformation of economic governance. During the New Deal period, technocratic reforms were instrumental in the expansion of bureaucratic and administrative structures that penetrated and reshaped American economic and civic life (Konings, 2011; Livingston, 2018; Panitch & Gindin, 2012; Rauchway, 2008). Just as the Federal Reserve’s role in safeguarding liquidity expanded, new institutions were designed to ensure the solvency of the American financial system. The Federal Deposit Insurance Corporation, the Federal Home Loan Bank Board and the Reconstruction Finance Corporation reshaped the American credit system by guaranteeing loans and recapitalising troubled banks. Through the direct extension of credit to citizens and small businesses, the New Deal involved not just a rebalancing of state and market ‘but rather a qualitative transformation of the uses of public authority’ (Konings, 2011, p. 80).

As Timothy Mitchell has shown, the idea of a ‘national economy’ itself is very much a product of this period of history. Given expression in the development of modern macroeconomics, such as in the writings of John Maynard Keynes, the economy reflected ‘the rise of the national state as producer of statistical knowledge and custodian of the economic’ (Mitchell, 2002, p. 247). It was the reflection not just of
an intellectual revolution but also the product of major geopolitical events, including ‘the collapse of the international financial system in the interwar period; the domestic crises of the Great Depression; the development of Soviet, New Deal, fascist, and other forms of state control of production, trade, employment, and investment’ (Mitchell, 2002, p. 5). Out of this period of intense political implosion and worldwide conflicts, and flanked by the dissolution of colonial empires, the national economy emerged. Soon after, in the creation of the Bretton Woods fixed exchange rate regime, national economies became embedded within an international financial architecture intended to preserve national policy space by protecting economies from speculative money flows (Helleiner, 1994).

Conceptually, the emergence of the economy as a distinct space of governmental intervention was linked to three intertwined revolutions in economic statistics, econometric modelling, and macroeconomic theory (Breslau, 2003; Morgan, 1990; Radice, 1984; Tooze, 2001). Within econometric models, it became possible to think of the economy as a dynamic entity, where instability is caused by exterior shocks and oscillations that would ripple through its structure. The idea that external forces could impact the economy implied a clear boundary between the economy’s ‘intrinsic structure’ and its ‘other’ (Morgan, 1990). The economy thus became something else than the market, something more concrete, spatially bounded: an interconnected system of highly aggregated economic interrelationships that could be measured and governed independent of social life. It allowed for previously disparate fields of social administration to be organised into fields of government that responded to the demands of modern economic policy and offered policymakers tools for strategic intervention into the economy to protect, balance, and shape the flow of money and resources (Mitchell, 1998). Within these institutional arrangements, the policymaker fulfilled the role of a skilled engineer, capable of intervening into the machineries of the economy and fix imbalances by stimulating public spending and redirecting the flow of resources (Braun, 2014).

Yet while the New Deal reforms embedded the Federal Reserve within the new structures of macroeconomic governance, the expansion of its public capacities came with contradictions. The Fed’s expanding administrative capacity and authority coincided with the removal of monetary policy from front-line politics and thus public attention. With monetary dynamics contained by administrative rules, fiscal policy
came to play a more prominent role in channelling money and resources into different sectors of the economy (Krippner, 2011). Without a doubt, the growing importance and legitimacy of fiscal interventionism can be related to the dominance of Keynesian ideas in postwar American politics (Rosenof, 1997). Yet under the new policy arrangement, the Federal Reserve found itself relatively unconstrained in its ability to ‘give shape to swift changes in global finance and to advance its institutional origins to monopolize the monetary system in ways that were unimaginable at its origin’ (L. Jacobs & King, 2017, p. 54). As the next section shows, it was this capacity for institutional reinvention has afforded the Federal Reserve a prominent role in the dissolution of Keynesian macroeconomics and in the transition to financialised capitalism.

2.2. The macroeconomic consequences of central banking

With the ascent of the national economy, central banks’ traditional focus on financial stability was increasingly displaced by macroeconomic objectives. The major debates about central banking in the second half of the twentieth century focused on themes such as the respective roles of monetary and fiscal policy in stabilising aggregate demand and establishing the conditions for sustained economic growth, as well as in reducing unemployment and in curtailing the inflationary tendencies of the economy. These debates all have one thing in common: by measuring central banking against macroeconomic indicators and aggregates, they tend to focus on the macroeconomic consequences of central banking, rather than on the details of what central banks do, and how their involvement in monetary or macrofinancial processes shapes the evolution of the macro-economy. As I will discuss below, analyses of central banking have thus taken on a somewhat ‘external’ character, with the legitimacy of central bank activity increasingly judged against its distributive consequences, rather than in terms of its capacity to substantially influence the processes of financialisation that it helped to sustain.

Central banks initially took on a subordinate role in the post-war economy characterised by the active role of government. In support of macroeconomic policy, central banks in advanced economies came to employ a variety of tools, including...
some form of credit policy and exchange rate management (Bezemer et al., 2021; Monnet, 2018). The Federal Reserve’s own role in assisting fiscal policy owed much to the experience of depression and war. During the Depression, monetary-fiscal cooperation was driven by a fear of deflation, as the Fed came to recognise that only government intervention could stop the economic freefall. During World War II, monetary subordination intensified as the Federal Reserve threw its full support behind the national economy, both by maintaining orderly conditions in government debt markets, and by fixing prices of that debt—in other words, by engaging in the monetary financing of sovereign debt (Meltzer, 2003). Following the war, the fight against inflation returned as the Fed’s main concern, and it thought to distance itself from supporting the government debt market. In the 1951 Fed-Treasury Accord, the Federal Reserve re-established its operational independence (Bremner, 2004).

By the late 1960s, the weakening of economic growth put the political consensus of the Keynesian era under increasing strain. For a while, economic growth had served as a key remedy for distributional conflict by enabling simultaneous growth in wages, consumption, investment, and profit. When economic growth faltered, inflation and expanded access to credit allowed, at least for a time, to mask the emergent distributional conflict by introducing additional resources in the form of money (Krippner, 2011). Internationally, inflationary dynamics were exacerbated by strains on the Bretton Woods architecture. By the 1970s, US trade surpluses gave way to deficits, and the growth of external dollar positions increasingly undermined confidence in the dollar’s value and gold convertibility (Triffin, 1960). Downward pressure on the dollar intensified further due to innovations in private banking which pushed into offshore Eurodollar markets. To curtail speculative hot money flows and shore up confidence in the dollar, states started to engage in coordinated international liquidity operations, most notably through coordinated swap line interventions designed to take pressure off the fixed exchange rate regime (Helleiner, 1994; Schenk, 2010).

Despite these efforts, falling domestic profit expectations and capital investments rendered American firms increasingly uncompetitive, leading to more imports that destabilised the Bretton Woods system further. By 1971, the scale of reserve outflows prompted the Nixon administration to announce a ‘temporary’ suspension of dollar convertibility to gold, a move that signalled the beginning of the end of the Bretton
Woods system. Over the next years, rising inflation and high unemployment accompanied the disorderly transition away from the fixed exchange rate standard to floating exchange rates. Oil price shocks in 1973 and 1979 destabilised the system further and created substantial surpluses for oil exporters which were subsequently recycled through the Eurodollar markets (Kapstein, 1994; Spiro, 1999). Rather than seeking to shape and control this new market, central banks decided to limit their role to backstopping the operations of major banks within the market. The resulting expansion and intensification of global financial relations laid the foundation for the tensions and contradictions that would lead to a series of debt crises in the 1980s (Lissakers, 1991).

As domestic and international financial markets were reregulated over the course of the 1970s, monetary policy increasingly came to be seen as the key remaining lever for policymakers to exert restraint on the economy. Yet given the distributional outcomes of high interest rates, and the associated political costs, ‘policymakers preferred to exercise this restraint discreetly, balancing the need to regulate the economy and at the same time avoid blame for unfavorable economic outcomes’ (Krippner, 2011, p. 25). With the onset of stagflation in the mid-1970s—a combination of slow growth and high inflation—technical debates about how to control inflation were increasingly overshadowed by monetarism, which offered a simplistic analysis based on a revival of the quantity theory of money, this time divorced from the progressive politics of its late nineteenth-century proponents. In Milton Friedman’s (1963) interpretation, ‘inflation is always and everywhere a monetary phenomenon.’

To deal with the situation effectively, the role of government in stabilising the economy ought to be limited to ensuring the steady rate of growth of the money supply, as other interventions—such as the full employment objective—were quickly ‘priced in’ by markets and ended up being counterproductive, eventually resulting in more, not less inflation. Contra to the discretionary practices of activist central banking during the Keynesian period, the lesson seemingly learnt by central banks was that they should confine themselves to controlling the quantity of money in circulation (Bernanke et al., 2018).

While Federal Reserve officials were intensely sceptical of the possibility of controlling the money supply directly, the monetarist recipe had political appeal. As Fed officials recognised, crushing inflation would require lifting interest rates to
unimaginable heights, curtailing easy access to credit and throwing the economy into recession. Ending the great inflation this way would place the blame for the destruction of the private economy squarely with the Fed. By targeting the money supply instead, the Fed could let interest rates adjust as needed—in effect, it would provide political cover to shift the blame for the adjustment to the market, rather than place it with the Fed directly (Krippner, 2011, p. 116). In 1979, under Chairman Paul Volcker, the Fed committed to the monetarist prescription to break the back of inflation. The embrace of restrictive monetary targets sent interest rates soaring to nineteen percent. As a result of the Volcker shock, the US was plunged into the deepest economic downturn since the Great Depression; by 1982, unemployment figures had reached double digits. By mid-1982, the Fed began moving back towards targeting interest rates, a policy that was continued by Alan Greenspan when he succeeded Volcker in 1987. The Volcker shock episode had proven highly consequential: inflation had reduced from 13 percent in 1979 to 4 percent in 1982, and it would remain in this range throughout the decade (Panitch & Gindin, 2012, p. 168).

While the Fed quickly retreated from its money targets, subsequent innovations in economic theory embedded the Fed’s anti-inflation stance into a firm policy framework. A key methodological innovation was to incorporate microeconomic foundations based on individual optimisation behaviour into macroeconomic models. According to the Lucas critique, Keynesian models had exhibited an inflationary bias because they ignored that policy choices designed to influence the economy would be factored into the decision-making of rational agents who would adjust their behaviour accordingly and thus neutralise government intervention (Sargent & Lucas, 1979). Economic management, in other words, was to be approached not as a game against natural economic laws, but as a performative game with rational agents (Braun, 2018). Drawing on the rational expectations approach, another challenge to activist central banking arose from the policy credibility problem (or time-inconsistency problem) as hypothesised by Kydland and Prescott (1977) and many subsequent authors. According to the policy credibility problem, central banks that seek to boost employment tend to be over-expansionist. Once actors anticipate this behaviour, higher inflation will thus become entrenched in the system and undermine the temporary boost in employment or output. Together, these interventions highlighted an incoherence at the heart of Keynesian macroeconomic models that provided the
intellectual justification for a hands-off policy approach: monetary policy could provide a useful ordering function to economic activity only if it abstained from discretionary policies, and instead retreated to a rule-bound, predictable role (Bernanke et al., 2018).

For Timothy Mitchell (2002, p. 246), the dismantling of interventionist Keynesian macroeconomics signalled the end of the national economy as a coherent entity: ‘In Anglo-American political discourse the market came to stand for a system of forces that the state claimed was independent of its management of the economy, setting limits that this management could not profitably transgress.’ No longer engineers skilled at manipulating the economic system to achieve socially desirable goals, policymakers came to think of themselves as rule-optimisers whose purpose was to provide a stable framework for economic growth via credit expansion. Of course, the discursive construct of ‘the economy’ continued to function as an important legitimating device for economic interventions. In targeting price stability, the Fed continued to rely on broad macroeconomic indicators. How then are we to understand the dramatic changes that were brought about by the turn in central banking?

For critics, the adoption of rules-based policy amounted to the ‘almost complete withdrawal of the state from monetary policy’ (Best, 2018, p. 338). The side-lining of Keynesian budget politics and wage growth in favour of inflation-targeting central banks reflected not a dismantling of the economy as such but rather a reorientation of the goals of economic policy and the associated limitation of popular pressure over policy decisions. The key consequence of this move is distributional: delegating monetary policy decisions to unelected, independent central bankers involves placing highly politicised distributional decisions beyond political argument (Abolafia, 2012; Watson, 2002). By the 1990s, the rational expectations revolution had crystallised into a dominant central banking policy paradigm that postulated that to deliver domestic price stability, politically independent central banks should focus exclusively on setting short-term interest rates in the unsecured, over-night interbank market (Woodford, 2010). This would prevent the inflationary bias of activist central banks while allowing monetary policy to control aggregate demand and inflation rates via the financial system as transmission mechanism (Bernanke & Reinhart, 2004). Central bankers of the early twenty-first century have often taken this institutional arrangement—associated in the United States with the period known as the Great
Moderation under Fed Chairman Alan Greenspan—as the optimal way to conduct monetary policy. The idea of central bank independence thus allowed central banks to present themselves as highly depoliticised institutions (Arsetis & Sawyer, 1998; McNamara, 2002; Polillo & Guillén, 2005).

The reorientation of monetary policy was a crucial aspect of what political economists have characterised as a paradigm shift from post-war Keynesianism to the neoliberal, market-liberal turn of the 1980s. According to Peter Hall (1993), a policy paradigm constitutes an ‘interpretative framework’ that is shared widely within the policymaking community and that specifies not just techniques and instruments of policy, but also the very nature of the problem that is being addressed. Paradigm shifts emerge when policymakers fail to address new problems within the existing paradigm. Anomalies are initially addressed by changing the instruments or techniques of policymaking—a process of social learning within the ‘normal’ parameters of policymaking that Hall calls first and second order change. It is only when the underlying goals of policymaking change that third order change (a paradigm shift) occurs.

Embedded within a broader political and electoral struggle, political economists have interpreted paradigm shifts not as the pure product of ideational change but always as the outcome of a protracted political struggle over meanings, and as such linked to question of authority (Blyth, 2013b). Notably, the ability of the Federal Reserve to reorient macroeconomic policy dramatically around price stability was possible because it was accepted and supported as legitimate and necessary by a broader political coalition. Driven by the election of President Reagan, the US government moved to curtail inflation by sharply reducing the bargaining power of labour through a series of institutional and procedural changes as well as direct confrontation. As Hall discusses in his analysis of the British turn to monetarism, politicians—rather than technocrats—are thus essential in bringing about change: ‘Policy changed, not as a result of autonomous action by the state, but in response to an evolving societal debate that soon became bound up with electoral competition’ (Hall, 1993, p. 288). The technical details of reforms might be implemented by unelected technocrats; the design of such changes however originates with changing public opinion and legislative action. Starting in the public sphere, a paradigm shift reverberates through the state apparatus (for a critique, see van ’t Klooster, 2021).
Placing the focus on ‘outside’ forces such as political programmes, ideas, or sectoral interests in reorganising the distribution of power within society has allowed critical scholarship to sustain compelling political narratives about the distributional consequences of specific policy agendas. As financialisation scholars have pointed out, the increasing role of finance in organising contemporary capitalism has come with a series of structural transformations that have elevated the profit share of financial over non-financial firms (Arrighi, 1994; Krippner, 2005), facilitated the globalisation of production and reoriented business strategies around shareholder value (Aglietta, 2000; Froud et al., 2000; Knafo & Dutta, 2020), and increased private household borrowing to compensate for stagnating wage growth (Crouch, 2009; M. Prasad, 2012). As documented by Thomas Piketty (2013), a key aspect of increasing inequality since the 1970s lies in the growth of wealth from property, pensions, and financial investments that has dwarfed economic growth in general and compounded the uneven distribution of assets throughout society. Through the radical reorientation of the state, the market-liberal turn thus heralded a broader realignment that fuelled the financialisation of the economy.

Yet viewing the shift in monetary policy practices as motivated by a broader political and ideational transformation in economic governance tends to obscure as much as it reveals. In focusing on the tectonic nature of the macroeconomic transformation of the 1980s, much of the literature ultimately abstracts from the more substantive content of the changes in central banking processes and market structures that sustained such macro-level change. For instance, studies of paradigmatic change in economic governance tend to emphasise the de-regulatory and market-liberal orientation of the neoliberal era at the expense of a closer examination of the deliberate re-regulation and market accommodating activities that characterised the transition to financialised capitalism (Konings, 2011; Mehrling, 2011; Thiemann, 2014). As others have shown, despite the pretence of rigid, rule-based technocratic governance, central banks do not simply provide an external framework for free markets, but instead remain deeply embedded within the organisation of market processes themselves (Braun, 2020; Özgöde, 2021; Walter & Wansleben, 2020). Making sense of these involvements however would require more than simply pointing to the distributional consequences of particular policy frameworks—most notably, it requires zooming in on the concrete
interventions and practices that constitute the day-to-day operations through which central banks have altered the architecture of finance (see Watson, 2007, p. 212).

Investigating the operative links between central bank policy and financial markets helps illuminate a key problem of modern monetary governance: while rules-based technocratic conduct has allowed policymakers to establish a distance between economic governance and popular pressures, the return of financial volatility has increasingly forced policymakers to adopt creative and activist strategies that violate the norms of rules-based governance (Konings, 2016; Özgöde, 2021). A key reason for this impasse was that the Federal Reserve’s intense focus on short-term interest rates tended to ignore the build-up of excessive financial elasticity in the system, resulting in more economic shocks, less stability, and higher levels of unemployment (Borio & White, 2004). To remedy instability, the Federal Reserve routinely relied on interest rate changes to neutralise any adversary developments in the financial sector. In introducing an element of discretion into rules-based practice, this so-called ‘Greenspan Put’ contributed to the build-up of excessive risk-taking of many financial institutions by reinforcing the markets’ belief that the Fed would counteract large declines in the market (Watson, 2014).

The global financial crisis and its aftermath brought the problem of financial instability to the fore. In terms of monetary policy, it forced the Federal Reserve to experiment with a set of ‘unconventional’ balance sheet policies. In terms of financial stability policy, the Fed had to expand its last-resort toolkit to meet the needs of market-based financial intermediaries. In neither domain has the Federal Reserve meaningfully managed to ‘normalise’ its conduct and return to the rules-based prescriptions of the Great Moderation. Yet while shattering the illusion of timeless optimal policy arrangements, post-crisis innovative central banking practices have also posed important conceptual difficulties for political economists. Whereas the implosion of the US subprime mortgage market appeared to vindicate critics of the unsustainability of the credit-driven consumption model, in the post-crisis period speculative financial practices have not only endured but have been placed on a firmer footing (Christophers et al., 2017; Gabor, 2021b; Konings, 2016). Instead of re-embedding finance within the confines of national economic management, central banks have reconceptualised their relationship to finance and created new interlinkages through which they facilitate and stabilise specific financial practices. The continuation of the status quo
thus has required significant innovation on the part of central banks and other regulators seeking to dampen the volatility of credit (Walter & Wansleben, 2020).

In this context, the constant violation and adaptation of purportedly hands-off ‘rules-based’ central banking cannot be interpreted as exceptional or external to financial practices, but rather as central to sustaining financial logics. An analytical vantage point concerned primarily with questions of the political legitimacy and the distributional consequences of central banking thus cannot adequately capture what is distinctive about the market practices of modern central banking.

2.3. The macrofinancial consequences of central banking

By eroding the certainties of the Great Moderation, the global financial crisis has opened spaces for policy entrepreneurs to challenge the methods and practices of central banking. At the level of technocratic policymaking, the decade after the crisis has seen some significant changes: unconventional monetary policies have utilised central bank balance sheets in shaping the trajectories of interest rates, the development of macroprudential regulation has expanded central bank responsibilities towards addressing financial instability and systemic risk, and deep interventions into government bond markets have led to a tacit reconsideration of the relationship between monetary and fiscal policy. Without challenging the dominance of finance in economic life as such, these innovations have reflected the need to maintain control over evolving financial processes to preserve the capacity to govern the macroeconomy effectively.

At the heart of this shift has been a reconsideration of the importance of the macrofinancial processes that underpin economic developments. The global financial crisis itself was initially framed in familiar macroeconomic terms. Early accounts of the crisis located the problem in the US subprime mortgage market. Soon, more structuralist accounts of the crisis’s financial origins started to emphasise the role of global imbalances between national economies in fuelling the US housing boom (Ferguson, 2009; Obstfeld & Rogoff, 2009). Already in 2005, Bernanke had argued that a ‘savings glut’ in Asia, most notably in China, and in other countries with current account surpluses had led to a strong demand for safe dollar assets. The resulting one-
way investments in risk-free US assets such as Treasury securities, government agency
debt and money market fund shares put downward pressure on US bond yields and
contributed to the asset market boom in the early 2000s (Bernanke, 2005). The
accumulation of potentially unsustainable external debt had led several prominent
economists to warn of an impending sudden stop in external financing that would see
the dollar devalue and interest rates surge (Roubini & Setser, 2005; Summers, 2004).
After the crisis, some scholars extended the global imbalances argument to show that
the structural demand for safe assets from surplus countries had fuelled the pre-crisis
securitisation boom in the United States by increasing leverage and risks in the US
financial sector (Caballero & Krishnamurthy, 2009).

What the focus on macroeconomic imbalances obscured, however, were the
disproportionate risks taken by European banks in their global dollar business. To
account for banking practices, proponents of an alternative ‘banking glut’ approach
(Shin, 2012) locate the geographic centre of the crisis in transatlantic banking
relationships that linked European banks to US capital and money markets (Acharya
& Schnabl, 2010; Bayoumi, 2017; Hardie & Thompson, 2020; Tooze, 2018).
Throughout the 2000s, permissive regulation in Europe had allowed European banks
to expand their balance sheets, notably their foreign currency investments. On the asset
side, European banks were expanding their dollar-denominated investments by buying
private-label mortgage-backed securities and other structured credit products. On the
liability side, they were funding these foreign currency investments by tapping
wholesale US money markets, for instance through the issuance and sale of asset-
backed commercial paper through special purpose vehicles to entities such as US
money market funds (Baba et al., 2008; McGuire & von Peter, 2009). Although the
‘round-tripping’ of such gross capital flows from and to US markets did not register
in macroeconomic current account net imbalances between Europe and the US and
thus remained marginal to the global imbalances story, the two-way flows that resulted
from the activities of European banks are now widely seen as having played a
significant role in enabling the growth of shadow banking and household leveraging
in the United States (Avdjiev et al., 2016).

In emphasising macrofinancial factors that drive the dynamics of interconnected
balance sheets, the banking glut interpretation disrupts the typical narrative of
macroeconomic aggregates. Instead of analysing the global economy as an ‘island
model’ in which national economy interacts with national economy, it shifts attention to the ‘interlocking matrix’ of corporate balance sheets (Tooze, 2018, p. 9). The new focus on bank-to-bank interactions removes a layer of abstraction from headline figures such as inflation or unemployment and instead focuses on payments relations itself. In the field of financial stability policy, this has allowed significant innovations that transcend the traditional governance of the national economy. A key innovation during the crisis was the use of central bank swap lines to stabilise foreign currency liquidity funding problems in disparate jurisdictions (Goldberg et al., 2010; Moessner & Allen, 2010). Through such swaps, the Federal Reserve effectively turned into an international lender of last resort, providing emergency access to US dollar liquidity to foreign (mostly European) banks. Domestically, last-resort interventions have increasingly turned the Federal Reserve into a ‘dealer’ or ‘market-maker of last resort’, indicating its growing importance in backstopping not just the funding conditions of banks, but the liquidity of key collateral markets on which shadow banking operations depend (Mehrling, 2011).

For political economists, the key benefit of the macrofinancial research orientation is that it allows a closer assessment of the institutional entanglements of central banks and financial markets. As the crisis demonstrated, central banks are active participants in financial markets that achieve their policy objectives by operating through the money markets. In line with Krippner’s (2007) astute observation that states increasingly govern through financial markets, recent studies have analysed how central banks have adopted private sector financial practices as they increasingly rely on the reach and scope of financial markets to achieve their policy goals (Braun, 2020; Gabor, 2016; Gabor & Ban, 2016; Walter & Wansleben, 2020). Such an approach has opened up new ways of analysing power relations at the very heart of the financial system: as political authorities seek to govern through finance, they grow dependent on the performance of specific credit infrastructures and afford increased leverage and political clout to certain market actors (Braun, 2020). Governing through finance entails enlisting and expanding the infrastructure of credit into a viable mechanism for the hands-off distribution of resources in the form of money. Viewed through the prism of central banks’ market-based activities, the shift towards financialised capitalism thus reveals profound changes in the way power operates at the very centre of financial markets.
Most significantly, this perspective allows us to reconceptualise the growth of shadow banking as an expression of the co-evolution of modern finance and forms of monetary governance over recent decades, rather than as a simple consequence of deregulatory and market-liberal policy decisions. A key aspect of shadow banking is the marketisation of financial intermediation (Godechot, 2016), a process that connects a variety of financial actors through two key activities: the construction of securitised assets through the repackaging of illiquid bank loans into tradable securities (Lysandrou & Nesvetailova, 2015; Thiemann, 2014), and the financing of such assets in wholesale funding markets, where securities serve as underlying collateral in repurchase transactions (Gabor, 2018; Pozsar, 2014). As studies have shown with respect to repo markets and securitisation techniques, the Federal Reserve and other central banks supported the development of such financial market techniques not simply out of a deregulatory zeal, but because they promised to enhance the monetary policy transmission mechanism and generate demand for sovereign debt (Braun, 2020; Dutta, 2020; Gabor, 2016; Wansleben, 2020). Read this way, the growth and development of the contemporary money market infrastructure is in part the consequence of policy decisions that encouraged greater risk-taking on the part of financial firms, reshaped short-term funding markets into a viable-yet-unstable governance infrastructure, and contributed to the proliferation of shadow banking actors, instruments, and techniques that easily cross national borders and connect actors from previously disparate national economies (e.g. Hardie et al., 2013; Ö zgöde, 2021; Sgambati, 2019; Thiemann, 2014).

Linking shadow banking to processes of monetary governance shifts the focus of analysis to the liability side of financial actors’ balance sheet—that is, to the growing network of debt that connects key actors within the web of the payments system (Knafo, 2022). Analytically, this shift has significance for our understanding of financial relations. Political economy scholarship concerned with the speculative and unsustainable nature of financialisation has tended to emphasise the asset side of financial actors’ balance sheets. Here, the focus is on how finance extracts value by ‘capitalizing on everything’ (Leyshon & Thrift, 2007) and generates income streams, for instance through the repackaging of mortgage products (Nesvetailova, 2010) or more generally through rentierism that centralises control over areas such as land, market infrastructures, or intellectual property rights (Christophers, 2020; Langley,
Focusing on the asset side has allowed these works to shed a crucial light on the insecurities and inequities of financialisation; yet it has tended to overlook the precise social and technical construction of financial markets (Christophers, 2015b). It too often black-boxed finance, treating it in functional terms as an instrument of the dominant creditor class whose hold over the real economy was near absolute (Streeck, 2014). By contrast, the macrofinancial perspective focuses on the technical construction of financial markets and locates power struggles in the processes through which states relate to market actors in a quest for control.

Macrofinance thereby allows a tighter grip on financial processes: it has forced a reckoning of the endogenous role of finance in expanding credit through complex business practices (Cetorelli & Goldberg, 2012) and the liquidity risks that actors face in doing so. As such, the macrofinancial perspective is crucial to the new banking regulations of Basel III and other macroprudential reform projects that address the problem of systemic risk. Macrofinance thereby disrupts the classic conception of economic policy: for government officials, good economic policy typically equated to what was good for GDP growth. Questions of distribution—the politics of who gets what, when, and how (Lasswell, [1936] 1990)—could be ‘weighed up against the general interest in ‘growing the size of the cake’’ (Tooze, 2018, p. 12). Macrofinance, with its focus on balance sheets, is first and foremost an analytical approach organised around the question of financial stability. Its far-reaching implications for economic governance—most notably, its recognition that finance and the state co-evolve endogenously—are not easily squared with the usual politics of central banking, which sees central banks primarily as rule-bound administrative agencies.

As a result of this disconnect, political economy scholarship has struggled to adequately capture post-crisis changes in central banking. Innovative changes in the market-based conduct of central banking have not been matched by a comprehensive re-evaluation of the role of central banking within society; there has been no major realignment of the central bank’s public mandate with the new realities of macrofinancial governance. As a result, while the crisis reinvigorated interest in financial stability policy, the debate on monetary and fiscal policy has remained wedded to categories of macroeconomic management. Faced with challenges to independent central banking after the crisis, policymakers have responded by strengthening the normative commitment to sound policy, most notably by
functionally separating new financial stability concerns from the more traditional norms of monetary policy. Financial stability policy now ‘augments (rather than replaces or amends) the inflation-targeting model of central banking that dominated the pre-crisis period’ (Levingston, 2021, p. 1475). As a result, the crisis is now widely recognised as a ‘status quo crisis’ (Helleiner, 2014) that failed to properly challenge the neoliberal consensus. Instead of a return to fiscal policies associated with Keynesian public ethics, the post-crisis era entered a prolonged experiment in austerity, sustained both by ideological and populist commitment to balanced budget politics.

Even scholars of macroprudential regulation now widely acknowledge the incremental nature of change. Initially, macroprudential reformers formulated far-reaching policy proposals designed to curtail the build-up of systemic risks (Baker, 2013). Yet despite drawing on potentially transformative intellectual insights from Keynes, Minsky, and others, policy actors have ultimately sought to render those insights compatible with pre-crisis policymaking and integrate insights into the endogenous nature of money and finance into formalised economic models recognisable to a pre-crisis audience (Levingston, 2021). In the process of implementation, regulators and central bankers have thereby side-lined more radical and interventionist anti-cyclical policy proposals (Thiemann, 2019) and focused on familiar themes such as institutional resilience instead (Brassett & Holmes, 2016; Cooper, 2011). Political economists have largely explained the lacklustre implementation of macroprudential reform primarily with reference to the entrenched interests of both policymakers and private finance (e.g. Ban et al., 2016; Moschella & Tsingou, 2013; Pagliari & Young, 2016; Tsingou, 2015).

The macrofinancial turn thus points primarily to change in the processes of monetary governance if not its macroeconomic or distributional outcomes. What has changed are the technical competencies of money market strategy and regulation rather than the mandate or target of monetary policy as such. A tectonic shift in the political landscape such as the one that accompanied the move to neoliberalism was missing in the immediate post-crisis period, highlighting the importance of power and authority, rather than just ideas, in affecting paradigm change. Yet the association of change with external political coalitions can also blind our analysis to the more subtle yet consequential transformations of monetary governance. The innovations in
technocratic central banking—the result of a protracted battle between those seeking to return to the familiar ‘normality’ of rules-based policy idealised during the Great Moderation, and those policy entrepreneurs that seek to place monetary and economic management on a new footing to meet the diverse challenges of contemporary societies—are hardly inconsequential. By studying the processes rather than outcomes of central banking, which cannot be properly historicised from the contemporary standpoint, we can thus better understand the nature of technocratic change and engage more precisely with current policy processes and their likely trajectory.

2.4. Conclusion

Over the last century, American central banking has transformed profoundly. Where nineteenth- and early twentieth-century monetary reformers saw the money question—the issue of who controls the financial system and who wins and who loses as a result—as the key organising issue of the time, the advent of modern macroeconomics embedded the question of money within broader issues relating to growth, employment, and inflation. Amidst the growing impasse of fiscal politics in the 1960s and 1970s, monetary policy regained an important function in economic governance precisely because it allowed policymakers to present economic governance as a de-politicised, technocratic process supported by stable rules and frameworks. Yet the turn to financialised capitalism put the rules-bound system of economic governance under increasing pressure because it combined low inflation with the build-up of significant financial instability.

As the global financial crisis and its aftermath demonstrated, maintaining control over increasingly market-based finance presented not just a challenge to the political legitimacy of central banking, but also put key operative and institutional arrangements of the pre-crisis period into question. As a result, the Federal Reserve has sought to adjust the ways in which it acts within and through markets. The significance of this transformation can easily elude our analysis, precisely because it occurred without challenging the dominance of finance in economic life as such. Viewed through the prism of conventional macroeconomic categories, this has created the impression within much of the political economy literature that we have witnessed
a ‘status quo’ crisis. By contrast, a *macrofinancial* perspective reveals these changes as far more consequential: they reflect the need to maintain control over evolving financial processes and preserve the central bank’s capacity to govern the economy effectively. Analysing how such transformations alter the architecture of finance and redefine sources of power within economic governance is at the very centre of what this thesis sets out to achieve. Having established the importance of the macrofinancial transformation in this literature review, the next chapter will provide a conceptual framework for assessing the politics of this transformation, which serves as the starting point for the empirical analysis in the rest of the thesis.
Chapter 3 – Conceptualising monetary governance and the problem of liquidity

What is distinctive about contemporary central banking is that interest rate policy, last resort interventions, and financial stability regulation all rely on the capacity of the central bank to make the balance sheets of financial actors more or less liquid. Regarding interest rates, the Federal Reserve increasingly operates both at the short and the long end of the yield curve to shape the price and availability of credit in the financial system. The Fed now also deploys its balance sheet more proactively to backstop markets, adding asset purchase programmes and dealer of last resort functions to its traditional, bank-based emergency lending toolkit. In addition, the Fed has taken on new regulatory and supervisory responsibilities under the guise of macroprudential reforms, tightly linking the liquidity position of major banks to their holdings of central bank reserves and sovereign debt. Within modern monetary governance, the organisation and distribution of liquidity thus acquires an outsized importance not just in crisis times, but within the everyday operation of the financial system.

The purpose of this chapter is to critically interrogate the post-crisis theorisation of liquidity and its governance. After having established the relevance of macrofinancial questions for modern central banking in the previous chapter, the present chapter provides important context for the discussion that unfolds over the next chapters. In line with the research questions posed at the beginning of this thesis, this chapter thus builds the conceptual toolkit to make sense of central banks’ market-based conduct. As I argue, understanding liquidity and the plumbing of finance provides an indispensable intellectual foundation for a critical macrofinance approach. Drawing on the policy literature, I first show how the rise of collateral-intensive shadow banking has prompted policy economists to reconceptualise liquidity as a problem of market-based intermediation. The benefit of the policy perspective is that it allows us
to think coherently about funding liquidity and market liquidity together and offers a model of the liquidity spirals that can exacerbate market downturns in repo-centric financial markets. Yet by placing the focus squarely on the balance sheet dynamics of private financial actors, the macrofinancial policy literature tacitly assumes that the role of the state can be reduced to backstopping and accommodating the financial system in times of crisis. Here, liquidity emerges as a fundamental but ultimately only technical problem.

To re-politicise monetary governance and develop a ‘critical macrofinance’ framework, in the next two sections I turn towards a political economy critique of liquidity. In the first instance, I consider contemporary work in the tradition of Hyman Minsky, a key progenitor of the contemporary macrofinance approach. Known primarily as a theorist of financial instability, Minsky’s concept of the ‘survival constraint’ has seen a recent revival within the ‘money view’ literature (e.g. Mehrling, 2011; Neilson, 2019). The money view highlights the centrality of liquidity within the everyday operation of the payments system and offers a key template for understanding the hierarchical and public/private hybrid construction of monetary economies. An inherent feature of the Minsky-inspired liquidity view, however, is that by focusing our attention on incipient instabilities, it tends to reproduce the technocratic interpretation of the state as primarily concerned with ensuring a certain level of liquidity within the system. Despite the advantage of a macro-perspective on the importance of financial plumbing, this approach thus equally ends up depoliticising monetary governance and remains relatively blind towards questions of power and the struggle for control between public and private actors over evolving financial dynamics. As discussed in section three, reintegrating these issues has been a key challenge for developing a critical macrofinance approach.

In the final section, I expand on the project of critical macrofinance by situating my analysis of liquidity within the context of what Gabor (2020, 2021b) calls the ‘de-risking state’. As states act and govern through markets, they have become reliant on markets’ robustness and liquidity, and therefore consistently prioritise policies that ‘de-risk’ private market activities. I argue that the growth of the de-risking state can be understood as the result of inefficiencies and contradictions in liquidity governance itself. The key paradox that confronts us with the de-risking state is that despite notable changes in the operational conduct of central banking—the full use of the balance
sheet to support liquidity—we have not seen a broader reconfiguration of the separate
goals of monetary policy, fiscal policy, and financial stability policy. As I argue, this
continuing division of labour provides strong obstacles for more radical changes in
the governance of finance: it is precisely because liquidity confronts policymakers
with a ‘difficult-to-classify, difficult-to-isolate’ problem that it cannot easily be
subsumed within individual fields of policy and instead requires a coordinated
approach (Wansleben, 2021, p. 914). In the absence of such coordination between
monetary-fiscal-financial interactions, public actors increasingly come to respond to a
series of dilemmas through haphazard and sometimes noticeably contradictory
initiatives as the money market strategies of their respective policy domains create
inconsistencies. Faced with such problems, policymakers are likely to continue to
stake their institutional status on current arrangements in order not to endanger their
political legitimacy. The result of this impasse is the expansion of liquidity insurance
as a last-resort mechanism to contain the contradictions of contemporary market
governance.

In summary, the chapter thus provides a conceptual framework that will aid the critical
macrofinance analysis presented in this thesis. As I show consistently throughout the
thesis, attention to macrofinancial questions requires us to take seriously the ways in
which central banks act within markets, and how interactions with private finance
change the very architecture of the financial system itself. The following chapters
apply these insights empirically by tracing the transformation of Fed policy
historically (chapter 4) and in the post-crisis period (chapters 5 to 7).

3.1. Liquidity and the rise of collateral-intensive finance

Following the financial crisis, policy economists have paid increasing attention to the
processes by which private financial actors produce liquidity and leverage their
balance sheets (Adrian & Shin, 2010). This reflects the recognition that the practices
that enable institutions to raise cash and trade assets in financial markets can have
important implications for financial stability and broader macroeconomic conditions.
As I have described in the previous chapter, the new-found focus on problems of
liquidity, leverage, and credit underpinned the macroprudential reforms that emerged
in the wake of the crisis. In this section, I take a broader view to describe how policy thinking on liquidity has evolved in response to the emergence of collateral-intensive finance over recent decades. By linking evolving practices of liquidity management to the growth of shadow banking, I show what is specific about liquidity as a governmental problem in contemporary markets.

The current policy literature breaks up discussions of liquidity into two categories: funding liquidity and market liquidity (see, for example, Brunnermeier & Pedersen, 2009; Tirole, 2011). Funding liquidity refers to the ability of a financial institution to raise cash. Sometimes associated with the liability side of a balance sheet, the concept can be traced back to the analysis of liquidity within traditional, bank-based financial systems. Here, a bank holds short-term liabilities (deposits) against long-term assets (loans). When confronted with sudden deposit withdrawals, the bank might be required to sell some of its assets in a ‘fire sale’ or acquire funding by borrowing in the interbank market. Yet if there is a general loss of confidence in the bank (for instance during a bank run), other banks might no longer be willing to lend to this particular bank or its counterparties, leading to a broader liquidity freeze in the interbank market. In that case, the bank might be forced to draw on emergency liquidity assistance from the central bank. By stepping in as lender of last resort, the central bank plays an important role in supporting funding liquidity and restoring confidence in the interbank market—a function that has well been recognised since the nineteenth century (C. Goodhart, 1988).

Market liquidity, by contrast, describes the ability to trade an asset in the market at short notice and with little impact on its price. The concept of market liquidity has gained in importance with the rise of shadow banking since the 1980s and 1990s, as banks and other institutions have moved away from relational banking and towards the securities trading and investment business (Hardie et al., 2013). Here, financial actors no longer hold loan-assets on their balance sheets but repackage them into tradable securities. For this reason, market liquidity is sometimes associated with the asset side of a financial actor’s balance sheet. Dealers or market-makers play an important role in this process by providing market liquidity to securities markets by offering buy and sell prices in specific securities and profiting on the spread between them (Stigum & Crescenzi, 2007).
The repo market in particular enabled dealer-banks to connect shadow banking actors by allowing the financing of securities inventories directly in the market. Repo markets are over-the-counter markets where repo borrowers exchange assets (collateral) for cash and commit to re-purchase the collateral at a later date (a day, a month, or more). Global repo markets have grown by about 20 percent between 2001 and the global financial crisis, driven by a significant expansion in the US and Europe (Gourinchas & Jeanne, 2012). Market liquidity is of the highest importance for collateral-intensive repo transactions: what denotes a ‘safe asset’ or high-quality collateral is an asset that trades in highly liquid markets and maintains its exchange value close to that of the cash loan. Lower quality collateral requires a higher haircut—the difference between the value of the cash loan and collateral posted—to protect the lender against the risk of a rapid fall in value of the collateral that would result in losses if the cash borrower defaulted. Given these requirements, sovereign bonds of advanced economies are typically recognised as the best collateral (Gorton & Metrick, 2012).

Via the repo market, dealer banks function as key intermediaries within the shadow banking complex, standing between large cash pools in search of safety, and various kinds of levered bond portfolios in search for yield (Pozsar, 2015). The former category consists of passive investors such as pension funds, corporate funds, and others that are too large to park their cash in traditional bank deposits and therefore tend to keep their cash with money market funds. These MMFs gather funds from retail and institutional investors by issuing shares that promise at par redemption on a daily basis, thus effectively mimicking traditional bank deposits. To meet their potential outflows, MMFs seek to keep the value of their shares constant by investing its shareholders’ funds in cash-equivalent products such as sovereign-debt backed reverse repo supplied by global banks. The latter category consists of active investors such as hedge funds and other levered funds from across the asset management complex. Unlike MMFs that are primarily interested in safety, these investors seek to ‘beat the benchmark’ (Pozsar, 2015, p. 54) and generate high returns for their

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1 Conversely, those who lend (i.e. invest) cash and take in securities as collateral are engaged in ‘reverse repo’ transactions. In balance sheet terms, reverse repos (cash investments) are recorded on the asset side, whereas repo (cash borrowing) constitutes a liability.
investors, typically by borrowing money via repo from global banks to invest in capital and derivative markets.

A key problem that confronted the financial ecosystem in the run up to the financial crisis was the shortage of government bonds that could serve as high-quality collateral, and the continuously falling yields on such safe assets that asphyxiated investment returns. To remedy this situation, shadow banks turned towards the manufacturing of private deposit substitutes with a strong claim to safety. Shadow banking can thus be understood as decomposing the practise of credit intermediation ‘into a sequence of discrete credit operations’ (Ghosh et al., 2012, p. 3) that connects opaque chains of bank and non-bank companies in the effort to convert ‘opaque, risky, long-term assets into money-like, short-term liabilities’ (Pozsar et al., 2012, p. 1). Before the crisis, asset-backed commercial paper, money market fund shares, and repurchase agreements all served as near-cash substitutes by offering instant at par convertibility into traditional bank deposit money (Murau, 2017). The added complexity of such shadow banking products, however, meant that new funding structures and resultant interdependencies grew into a source of systemic financial fragility as financial actors turned towards short-term wholesale funding to enlarge their balance sheets.

With the rise of the shadow banking complex, many market observers had initially expected the importance of funding liquidity to decline (e.g. CGFS, 1999). After all, if the asset side of a financial actor’s balance sheet consists of tradable securities, there should be less need for these actors to obtain external funding for their financial liabilities. This idea, however, proved problematic on two accounts: firstly, funding liquidity remains necessary to take positions, because trading always requires capital. While a dealer can buy a security and then pledge it as collateral, they cannot refinance the entire price in the market. The difference between the price of a security and its collateral value is denoted as the margin or haircut and must be funded by the dealer directly (Brunnermeier & Pedersen, 2009). For this reason, a securities dealer usually maintains a credit line to a bank as a critical backstop to its trading activities. The second problem is that while access to market liquidity might help an individual institution overcome maturity mismatches, it can never fulfil this role for the financial system as a whole: market liquidity can disappear from market segments when there are no more buyers in a falling market, for instance when market participants crowd into safe assets (Borio, 2009).
To address these shortcomings, post-crisis research has started to analyse funding and market liquidity together. As brought home by the global financial crisis, a decline in asset prices can easily translate into funding difficulties for institutions; and vice versa, funding difficulties that lead to fire sales can exacerbate declines in asset values. Brunnermeier and Pedersen (2009) have defined such events as downward ‘liquidity spirals’. Consider the example of a dealer bank that finances their trading activities in the repo market. As dealers fund their activities by repo-ing out some of their securities inventory as collateral, they need to watch the asset value of the underlying collateral: in repo transactions, collateral assets are marked-to-market on a daily basis. When collateral assets fall in price, dealers will be required to provide additional collateral or cash to satisfy margin requirements. The dealers then need to obtain additional funding liquidity through expensive bank borrowing or, in the last instance, through the ‘fire sale’ of assets in a falling market. Yet when dealers are forced to scale down their balance sheets by selling assets, their attempt to obtain funding liquidity will exert further downward pressure on asset prices and worsen market liquidity conditions. As the destabilisation of assets values exacerbates funding problems for individual institutions, the positive feedback loop continues, and downward liquidity spirals become systemic.

In the context of a liquidity spiral, it is not enough for the central bank to support bank funding conditions through its traditional emergency lending operations (e.g. Hauser, 2021; Tucker, 2018). What matters is the ability of dealers to stabilise asset prices by finding an immediate buyer. The central bank can play an important role here by stepping into the market and becoming a dealer or market-maker of last resort. During the financial crisis, the Federal Reserve put a floor on asset prices by intervening in short-term money markets. By acting as central counterparty between borrowers and lenders, the Federal Reserve effectively took over the market-making function that had previously been filled by the private dealer system. The move to a market-maker of last resort function reflects a growing recognition within the policy community that in market-based systems, financial stability requires central banks to support liquidity also in collateral markets, rather than simply lend to individual financial actors.

In sum, based on the re-conceptualisation of liquidity around the distinct-yet-interrelated problems of funding and market liquidity, the recent policy literature has developed important conceptual tools for making sense of financial instability in
collateral intensive markets. Yet while drawing attention to instability and modes of central bank interventions needed to stabilise markets, the policy literature offers relatively little insights into the role of the state in organising liquidity more broadly and along public interests. As the following sections show, introducing a political economy lens to make sense of liquidity allows us to ask pertinent questions about the role of the state in the stabilisation of financial markets.

3.2. Liquidity in the Minskian tradition: a no-nonsense view of money and banking?

In drawing on themes of liquidity and instability, the policy literature shares important similarities with critical political economy and heterodox economics research inspired by the work of Hyman Minsky. After briefly introducing Minsky, the primary purpose of this section is to analyse what contemporary interpretations of Minsky can contribute to a re-theorisation of liquidity. Specifically, I show how the revival of Minsky’s concept of the ‘survival constraint’ has allowed the literature to highlight the centrality of liquidity within the everyday operation of the payments system. Minsky’s key themes—that capitalism is inherently financial, and that it tends to instability in good times—offer the starting point for a ‘critical, nononsense look at banking’ (Minsky, 1986, p. 255) that takes the speculative character of financial relations seriously. An inherent feature of the Minskian liquidity view, however, is that it focuses our attention on incipient instabilities, and thus frames the challenge of monetary governance primarily as one of ensuring a certain level of liquidity within the system. As I discuss in the next section, this perspective depoliticises monetary governance and remains relatively blind towards questions of power and the struggle for control between public and private actors over evolving financial dynamics. As such, interpretations based on the Minskian stability view tend to reproduce the prescriptions of contemporary financial governance.
3.2.1. Minsky and financial instability

Hyman Minsky (1919—1996), best known today for his Financial Instability Hypothesis, was an eclectic economic thinker whose work defies easy categorisation. His intellectual trajectory can be understood as a critical response to the post-war neoclassical synthesis that sought to reintegrate John Maynard Keynes’ macroeconomic revolution into the general equilibrium models of neoclassical economics. For Minsky (2008 [1975], p. 66), Keynesian economics was about ‘permanent disequilibrium’, a problematic that the neoclassical synthesis had sidelined, most notably by giving short shrift to endogenous financial dynamics. To counter the bastardisation of Keynes, Minsky analysed instability as an inherent feature of the financial relations that give rise to investment under conditions of uncertainty. As Minsky (1986) saw it, monetary and real sectors were intimately connected as investments were financed by indebtedness. Under conditions of uncertainty, the prevailing assumption that investments would generate sufficient profits to repay debts could not be taken for granted. Moreover, uncertainty was not just intrinsic to the process of real investment, but also inherent to the financing activities of the financial sector. Rather than seeing banks as mere intermediaries of savings—that is, institutions that were effectively only passing on ‘loanable funds’—Minsky noticed that like any other firm, banks innovate to reduce costs and increase revenues. With time, the effect of such innovations would have a profound impact on the structure of the financial system and by extension of the non-financial system.

Minsky’s theory was as the theory he attributed to Keynes: it was simultaneously ‘an investment theory of fluctuations in real demand and a financial theory of fluctuations in real investment’ (Minsky, 2008 [1975], p. 55). Regarding the former, it was a theory that saw investment as the primary cause of income fluctuations across business cycles. Regarding the latter, his theory recognised that debt-financed investments created particular risks. Typically, higher profit expectations would fuel additional debt-financed investments, leading to higher indebtedness and increased risks. The relationship between debt and profit is also the basis for his Financial Instability Hypothesis (Minsky, 1986). Minsky perceived of debt-fuelled, leveraged speculative positions as depending on an intersubjective sense of euphoria amongst investors that sustains the belief that asset prices will continue an upward trajectory. For Minsky (1982, p. 26), ‘stability is destabilizing’—it fuels an illusion of liquidity (Nesvetailova,
2008) that can quickly give way to panic should optimism turn. Yet while instability is endemic, Minsky also recognised that instability rarely caused large-scale depressions. In his framework, the economy’s broader institutional structure provided important ‘thwarting mechanisms’ that prevented instability from becoming explosive—such as labour market institutions, regulatory frameworks, or lender of last resort interventions (Ferri & Minsky, 1992).

Following Bezemer (2021), we can distinguish two separate strands of contemporary research that have emerged from Minsky’s ideas. The first one, prominent within post-Keynesian thought, emphasises the relevance of Minsky’s approach for macroeconomic outcomes. In line with the financial instability hypothesis, scholars have emphasised the speculative nature of what Minsky termed ‘money manager capitalism’, resulting in recurring financial crises and underinvestment in productive industries (Keen, 2013; Wray, 2011). Drawing on Minsky’s commitment to big government, studies have explored his analysis of public institutions as market stabilisers or even market makers. Notably, this includes not just the central bank as lender of last resort in the money markets, but also governments as employers of last resort in labour markets (Wray, 2007). Others have relied on Minsky to show how long-run growth can be aided through the dynamic cooperation of private and public sector actors (Mazzucato & Wray, 2015), or through the socialisation of investment itself (Bellofiore, 2014). What unites these studies is the use of Minsky’s instability framework to highlight the need for interventionist measures to stabilise the economy and channel investments in line with the public interest.

The second strand of research abstracts from the macroeconomic content of Minsky’s work in favour of a narrower financial analysis. Known as the ‘money view’ (Mehrling, 2011; Neilson, 2019; Pozsar, 2014), this approach takes inspiration from the significance Minsky affords to liquidity as a crucial component of the payment system. Minsky thought of payment relations as integral to structuring economic activity. In their everyday activities, all financial actors are confronted with constant cash outflows and cash inflows, and their actions are conditioned by their ability to meet payment obligations in time: they face what Minsky called a ‘survival constraint’. While Minsky himself has only used the term in his doctoral dissertation,  

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2 Bezemer (2021) terms the macroeconomic approach the ‘model Minsky’, highlighting Minsky’s attempts to integrate Kalecki’s profit equation and his work with Ferri on accelerator-multiplier models.
the survival constraint has become a key feature of the money view literature (Mehrling, 1999). Methodologically, the money view Minsky differs significantly from the macroeconomic Minsky: it assumes a market micro-structure perspective that views every economic actor ‘as a bank’ and therefore perpetually engaged in the quest to generate positive cash flow. The abstraction from macroeconomics—though not without problems—allows the money view approach to make liquidity the focal point of analysis and focus on the institutions and processes at the heart of financial capitalism’s dynamics. In what follows, I show how the money view perspective of liquidity can help us place the policy discussion of the previous section within a broader, more systematic framework of analysis.

3.2.2. The survival constraint: a money view approach

The first advantage of the cash-flow approach is that it allows us to think of economic activity as coordinated not by the abstract figure of equilibrium but by a set of evolving and unstable payment relations (Minsky, 1993). A key methodological element of the money view is to approach the monetary and financial system through an analysis of balance sheet dynamics. Balance sheet entries and the accounting conventions on which they are based show money as a reflection of financial reciprocity: for every asset registered on a balance sheet there is a corresponding liability on another balance sheet (Bezemer, 2016). By providing funding for investments or to bridge temporary cash flow imbalances, the endogenous expansion of credit serves as an important source of elasticity within the payment system. At the same time, the survival constraint acts as an important disciplining force: as the quality of credit claims is always tied to a set of shared expectations about future values that can be destabilised by a shift in expectations, economic actors can experience difficulties in settling their debts. During times of far-reaching downward market adjustments, the inability to settle debts manifests itself in the form of financial and economic crisis. Just as credit expansion can create elasticity within the payments system, the (in)ability of individual actors to create or obtain liquid claims fundamentally depends on their own position within the broader financial ecosystem and forces them to take their own survival constraint seriously (Mehrling, 2012).
In placing the liquidity-optimising strategies of financial actors at the centre of analysis, the money view has served as a fruitful starting point for recent studies in critical political economy, critical legal studies, and heterodox economics. Collectively, the cash-flow perspective that underpins this approach helps us understand the hierarchical and hybrid construction of monetary claims that are organised around central nodes for clearing and settlement. The first insight is that credit-money claims are hierarchically ordered based on the quality of the underlying claims. Far from a neutral technology of exchange, money is best thought of as a ‘social relation of debt and credit denominated in a unit of account’ (Ingham, 2004, p. 12) that ‘embodies a promise to accept each other’s debt’ (Gabor & Vestergaard, 2016, p. 3). Monetary claims are endogenously created in the act of granting credit: most commonly, this is done in form of a bank loan, as has long been recognised by theorists of endogenous money (Bell, 2001; Chick, 2013; Wray, 1990). Increasingly, however, it is also done through shadow banking practices that manufacture private deposit substitutes (Gabor & Vestergaard, 2016; Murau, 2017; Nersisyan & Dantas, 2017). The ‘money-ness’ of such claims is determined by the ability to convert these forms of credit (promises to pay money) into money proper (the final means of settlement, such as central bank reserves). At the top of this hierarchy are debt instruments that are easily used as means of payment, such as cash or bank deposits. Further down the hierarchy are various layers of assets of more attenuated money-ness. Hierarchy matters because it creates a pecking order that derives from the need to settle debts (Mehrling, 2012).

The second insight, namely that money is a public/private hybrid, derives from here. The hierarchy of credit claims is stabilised once the state creates the legal and institutional mechanisms necessary to preserve money-ness, such as deposit insurance for bank deposits, or lender of last resort facilities that ensure the par convertibility of claims into final settlement money (Chick, 2013). The state thus plays an important role in stabilising credit money and those infrastructures of credit that are tied up with them (e.g. Awrey, 2017; Braun & Gabor, 2020; Hockett & Omarova, 2016; Mehrling, 2011; Pistor, 2013; Ricks, 2016, 2018). Due to the state’s fundamental involvement in organising debt relations, money markets and the payment relations that underpin them are always shaped by the interaction of private market participants with public authorities. How states and their central banks try to govern money and through which
mechanisms they situate themselves in relation to economic activity thus influences both how finance operates and how modern statecraft evolves (Giannini, 2011; Knafo, 2013; Ugolini, 2017).

The third insight is that hierarchical payments systems require central nodes for clearing and settlement. What knits together all those credit claims of differing quality into a coherent whole are financial actors that ‘make markets’ through their balance sheet operations. As described in the previous section, market makers or dealers generate liquid markets by offering buy and sell prices in specific securities and profiting on the spread between them. Oftentimes, this involves buying in one market and selling in another as dealers leverage their privileged access to money market funding for capital market lending (Grad et al., 2011; Mehrling, 2011; Nersisyan & Dantas, 2017; Sgambati, 2019). Institutionally, market power is highly concentrated, with a small amount of globally oriented banks and other depository institutions dominating money market funding (Stigum & Crescenzi, 2007). These institutions make markets for themselves and other financial actors not just by providing market liquidity (through the buying and selling of securities) but also by organising the infrastructure of trading: for instance, they construct clearing houses and payment and settlement systems to facilitate and standardise the exchange of securities (Genito, 2019; Lindo, 2013).

Through their operations, dealers effectively reduce a qualitative difference (between hierarchical credit claims) to a quantitative difference, expressed in terms of the price and yield of various financial assets (Mehrling, 2012). The hierarchical distinction disappears from view as long as dealers maintain the balance sheet capacity to provide sufficient liquidity (Grad et al., 2011). The business operations of financiers, often interpreted as a key source of instability, thus equally function as an endogenous source of stabilisation by providing the funding needed by other economic actors to meet their survival constraints. This is not to say that highly leveraged dealer-banks cannot produce instability. In fact, their complex business models tend to encourage balance sheet overexpansion that aid the pro-cyclical build-up of financial fragilities and monetary imbalances across financial cycles. Hierarchy reasserts itself during such moments of crises when the market-making capacity of dealers breaks down. In

3 Mehrling (2011) adopts the dealer model not from Minsky directly, but instead from John Traynor.
such instances, central banks play an important role in stabilising asset prices and financial institutions. The central bank’s management of systemic risk thus can be understood as the extension of the ordinary practices of risk management conducted by dealers in their normal operations.

By viewing market making and market governance as intricately related, the ‘money view’ interpretation of Minsky takes speculative behaviour as its starting point, rather than as the mechanism that derails financial expansion. As such, the money view closely follows the insight that uncertainty cannot be reduced to risk. Within the everyday operation of the payments system, the survival constraint creates an inherently unstable and speculative standard around which financial activity is organised, and from which financial expansion originates. Viewed in this way, speculation cannot be perceived as a pure aberration (though of course, speculative behaviour can be misguided), but rather is foundational to economic activity itself. As a result, monetary governance should not be understood as a way to suppress speculation, but rather as an attempt to organise and stabilise an inherently speculative financial standard (Konings, 2018).

Overall, the key benefit of the money view perspective is to direct our attention to the implications of the survival constraint for the evolution of financial structures and the variety of credit claims they produce. While this yields an incredibly useful analytical approach to the intricacies of the financial plumbing, it is not without blind spots. In positing that economic activity is fundamentally organised around the survival constraint, the approach methodologically renders all institutions as fundamentally alike, thereby abstracting from socio-political and institutional specificity. Of course, proponents of the survival constraint would maintain that function does not determine form, and that financial structure is always historically and institutionally mediated. Yet in preserving the essential economism of the survival constraint, this starting point offers a rather thin institutionalist reading of historical change. By abstracting from the ‘macroeconomic Minsky’ outlined at the beginning of this section, issues of profit, power, and the struggle for control over the evolutionary dynamics of finance are reduced to a mere question of stabilising an inherently speculative payments system. As the next section shows, bringing these issues back in yields a productive starting point for a critical political economy of modern monetary governance.
3.3. Bringing the question of power back in: towards a critical macro-finance approach

The benefit of the highly financial interpretation of Minsky is to direct our attention to the crucial question of cash flow within financial capitalism. Yet by perceiving of economic activity as thoroughly grounded within the logic of the survival constraint, the money view literature has turned a blind eye on traditional concerns of political economy—namely, the distribution of power within finance, and the relationship between the state and private finance in structuring and directing investment. In this section, I analyse these shortcomings in two steps. First, I discuss how the money view’s analytical focus on cash flow—rather than income and profit—side lines important questions of financial power and capital accumulation; and second, I show how this lack of attention to the question of power leads to a rather apolitical discussion of the state.

3.3.1. Profit and the question of power

A key aspect of the money view as outlined above is the analytical primacy of the survival constraint. Based on this starting point, the literature has tended to give greater explanatory power to cash flow than to income or profit itself. Insofar that profits lead to cash flows, they are of course intricately related. Yet for the money view literature, it is ultimately the need for cash flow that conditions economic activity, which justifies reducing profits to the cash flows they generate. The benefit of this perspective no doubt is that it allows us to see beyond the problem of solvency—a question of whether loans would be profitable, and assets generate returns. The problem of solvency, the money view suggests, can be indefinitely deferred as long as immediate payment constraints can be overcome again and again (cf. Konings, 2018, p. 76). Yet arguably this takes the cash flow perspective further than Minsky himself ever did. Minsky’s financial analysis was intricately linked to macroeconomic questions of investment and employment. As Bezemer (2021) highlights, Minsky understood very well that debt-financed investment was a necessary ingredient of profit generation in the economy. It was precisely for their capacity to disrupt future investments, and by extension future profits and attendant cash flows, that Minsky paid close attention to speculative overextensions in the
financial sector. While individual actors can defer the survival constraint through borrowing, for the economy as a whole, the generation of profit is crucial to maintain the position-taking of individual actors that allows credit to circulate. By taking financial business practices seriously, Minsky could see that ‘the survival constraint is not the ground for everything else, but it is itself grounded in profit and investment’ (Bezemer, 2021, p. 395).

To be sure, the profit motive is to some extent recognised by the money view literature. For instance, dealers’ market-making activities are based on the profitability of the underlying arbitrage trades (Neilson, 2019). But the profit motive is given little analytical weight, it is typically reduced to a by-product of lending money at interest (the intermediation spread), an activity that is primarily seen as providing a public good (liquidity) through private market practices. By contrast, foregrounding the profit motive would require us to think not solely about the market-making capacity of dealer-banks, but about their market-shaping potential—that is, their ability to organise markets in their own interest. By ignoring the question of profit, the money view thus implicitly suppresses the question of financial power—a key question for those interested in what trades can be made profitably, which institutions gain in importance over time, and how market infrastructures come to benefit from state support.

Recent contributions from within the emerging research direction of critical macro-finance have sought to reintegrate the question of power, most notably by focusing on the problem of leverage. In finance, ‘leverage’ typically describes the ability to borrow to make investments; it involves taking ‘a position in an asset without having to provide all or any funds for the position’ (Nersisyan & Dantas, 2017, p. 291). Leverage tends to confound political economy analysis: leveraged financial actors can either be seen as powerful due to their ability to do a lot with limited capital (Knafo, 2020), or weak because of their exposure to adverse market movements that endanger their repayment schedules (Hardie et al., 2013). To make sense of the special role of leverage within financial markets, it is helpful to distinguish between debt and leverage. Following Sgambati, the former can be understood as borrowing to settle obligations or make payments; and the latter as borrowing to invest. The second form of borrowing reveals debt not as a constraining force but rather ‘as a basic rule for
enabling one’s agency in society and an instrument of emancipation’ (Sgambati, 2019, p. 292).

From the perspective of leverage, the process of banking can be understood as dealing in debt: banks actively monetise other people’s debts by turning them into commodities that can be traded and accumulated as capital (Sgambati, 2016). Through these operations, dealer-banks retain important pricing power and the capacity to shift markets in the direction they find advantageous (Christophers, 2015a). For instance, in exploring profit opportunities, dealers have woven together money markets and capital markets. As Mehrling et al. (2013, p. 2) describe it, the process of shadow banking can be summarised as ‘money market funding for capital market lending’—take the example of mortgage-backed securities that are repackaged into asset-backed commercial paper and sold to money market funds. Combining these two markets creates particular problems, most notably the enmeshing of the process of price discovery in capital markets with the need for price stability in money markets (cf. Sissoko, 2016, p. 12). Yet while the cash flow perspective directs attention to the problems of price stability in the money market, it has relatively little to say about the process of price discovery in capital markets. Put another way, the focus on crisis and volatility conceals the power to set prices elsewhere that is wielded by dealer banks in their everyday operations (Knafo, 2020).

The market-making and market-shaping power of banks can be interpreted in two ways. In the first instance, leverage can be understood as a passive source of power. By organising markets around their own debt commitments, banks effectively make sure that others become invested in their continued existence (Konings, 2018). To that end, banks actively seek to maintain the confidence and trust of their customers to make sure that their deposits continue to function as payment devices (Sgambati, 2019). Banks’ status as too-big-to-fail institutions thus is actively cultivated through expansion and interconnectedness—a process that has led to increasing consolidation within the banking sector, with a handful of global megabanks controlling a significant market share (Christophers, 2015a; Knafo, 2022). Banks also derive a second, more agential form of power from leverage. Banks shape the very markets they make precisely because profit animates lending. To maximise returns and market share, banks seek out liquidity-optimising financial innovations—that is, active asset and liability management. As the history of US finance shows, through financial
innovations banks managed to extend their reach into new markets, tap new sources of funding, and ‘greatly expand their assets and dynamically adjust their funding to their needs’ (Knafo, 2022, p. 40).

The focus on profit and the capital accumulation strategies of finance forces us to think about a second crucial issue: how do profit-oriented changes in business strategies interact with monetary and financial governance? Minsky (1957) thought of endogenous change in the financial structure as driven by both public and private dynamics. On the private side, actors introduce liquidity-optimising strategies that relax individual balance sheet constraints, such as through the development of new structured products or trading practices. On the public side, financial structure is shaped by a conjunction of policy initiatives and legislative changes, generally in response to financial innovation or a perceived malfunction of the financial system. It is towards the public side—the question of monetary governance and its relationship to capital accumulation—that I now turn.

3.3.2. Monetary governance and the question of power

Removing the question of power from the everyday operations of the (shadow) banking system generates a significant problem: rather than seeing the coevolution of finance and its governance as a struggle for control over macroeconomic outcomes, it skews our analysis around the question of stability—of ensuring the coherence and proper function of the payments system. Viewed this way, it is difficult not to naturalise the backstopping arrangements that states provide as a logical feature of financial governance. A key example here is Mehrling et al. (2013) who argue that just as shadow banking itself can be understood as the financial sector’s adaptation to financial globalisation, the Federal Reserve’s evolution from a lender of last resort to a dealer of last resort is best seen as the logical institutional adaptation to this new market environment. In backstopping the evolving needs of capital, the central bank simply offers a ‘natural’ expansion of already-existing institutional norms—it moves from backstopping (banking) institutions to backstopping (shadow banking) instruments, such as repo.

Making such linear projections, however, does not explain why certain backstopping arrangements are adopted by some central banks, and others are not. Over the last
decade, for instance, the Bank of England has been far more vocal in adopting a market-maker of last resort role than its counterparts in other advanced economies (Birk & Thiemann, 2020); a question that can only be addressed by considering the role of politics and ideational struggles in influencing the historically contingent interactions of the state with finance. In abstracting from socio-economic specificity, the money view literature is thus in danger of reverting to the type of ‘logical’ explanation of central banking that I have criticised in the previous chapter. Put another way, the problem with such interpretations is that they leave us with a rather ‘thin’ reading of the public/private hybridity of finance in which the state supports credit claims and market infrastructures without independent objective, and purely as to prevent systemic events within markets.

An alternative approach requires us to take the strategic and developmental nature of state agency in financial markets seriously. This aspect has long been neglected in the context of the United States, with state capacity often seen as weak due to the highly fragmented nature of the state apparatus. For instance, Seymour Lipset (1990, p. 54) characterised the US as ‘the laissez faire country par excellence’, based on the distrust of concentrated power and a love of unbridled market competition that had stifled the growth of interventionist state institutions (Hartz, 1943; Lipset, 1996; Quadagno, 1999). A growing body of scholarship has questioned this premise, highlighting the active role that the US government has played in developing and nurturing markets (e.g. King & Lieberman, 2009; Konings, 2011; Novak, 2008). Most notably, these authors have argued for the need to look beyond the state’s external image and focus instead on its complex institutional linkages with social life. As Sarah Quinn (2010, p. 6) shows, a key aspect of these hidden state features is the use of indirect policy tools ‘as government programs that function by inducing another entity into action toward a desired end.’ Indirect policy tools allow the state to project an image of neutrality—of a clear boundary between the state and its ‘other’, civil society (Mitchell, 2006)—while simultaneously allowing the ‘build-up of an elaborate, intricately interconnected constellation of control mechanisms’ (Konings, 2011, p. 6).

Through its connections to social life, the state obtains what Michael Mann (1984) calls ‘infrastructural power’, that is, the capacity to implement projects by drawing on its levers of connectivity across civil society. As Krippner (2011) shows, this mode of interconnectedness allowed the US state to shift towards ‘governing through finance’
during the period of political gridlock over fiscal politics in the 1970s. In turning away from Congressional politics and transferring a high degree for macroeconomic control onto the monetary policy apparatus, US policymakers allowed the allocation of resources to be influenced not by overt budget politics but by deference to the ‘market mechanism’—that is, in the form of credit, controlled via interest rates. Similarly, Quinn (2017) highlights the use of off-balance sheet entities such as Fannie Mae that provided federal credit aid to the housing market and promoted the mortgage-backed securities market outside of the formal frame of highly contentious budget politics.

Through indirect policy tools, policymakers discovered new ways not just to backstop, but rather to nurture new markets and move them into a direction beneficial to public interests that would not arise from the profit-driven operation of private actors themselves (see also Hockett & Omarova, 2015).

Infrastructural power however is a contradictory affair: the bricolage-like nature of social connections underpins the reach of the state, but it does not mean that elite actors enjoy a unique advantage in understanding and manipulating the complexities of socio-economic life. The technical complexity of adjusting the operational modalities of governance to changing market environments means that governing ‘through’ finance is always an inherently exploratory and inexact process of realigning governance technologies with market infrastructures (Walter & Wansleben, 2020). As Braun (2020) shows, the infrastructural entanglements between the state and finance confer significant power onto those financial actors tied up directly with financial governance. In transferring specific rights and safeguards to primary dealers that market sovereign debt, for instance, states have effectively underwritten the profitability of their business models. Similarly, when resisting the reregulation of monetary policy transmission instruments such as the repo markets, central banks typically not just respond to private industry’s lobbying power, but more likely have the importance of these financial infrastructures and financial practices for their own governance apparatus in mind.

In the struggle for control over evolving financial dynamics, central banks thus tend to have a vested interest in maintaining the reach and scope of the market infrastructures they rely on to achieve their macroeconomic policy targets. Yet while transformations in market-microstructure can feed back onto the macro-orientation of the state—notably, by reconfiguring modes of (emergency) liquidity assistance—the
transformation of such governance functions is never as seamless as it might first appear. Instead, transformations in the configuration of liquidity support depend to a crucial degree on the ways in which policymakers problematise their relationship to markets, the limits of their own political mandates, and the ways in which their own fields of expertise (such as monetary policy) line up with others (such as financial stability regulation). As I show in the next section, to understand the macrofinancial turn in monetary governance, we thus need to understand how changes in liquidity governance have disrupted established fields of policy by altering the very architecture of finance, and what consequences such disruptions bear for the ability of policymakers to respond proactively to the evolving problems of the financial ecosystem.

3.4. Monetary governance and the rise of the de-risking state

As central banks act and govern through markets, they have become reliant on markets’ robustness and liquidity. This function, visible in the context of monetary policy, increasingly shapes a broader array of state policies. A useful starting point for making sense of this tendency is the concept of the ‘de-risking’ state (Gabor, 2020, 2021b). While variously understood as the result of political and ideological commitments to securing private sector profit opportunities, I argue that the growth of de-risking functions can also be understood as the result of inefficiencies and contradictions in liquidity governance itself. States are required to become more proactive in securing liquidity across different asset classes, markets, and actors precisely because the governance of liquidity within market-based financial systems has become increasingly complex—that is, a problem that cannot be addressed through isolated interventions, but requires an integrated approach across different fields of government. The lack of such an integrated approach, I suggest, pushes states and their central banks into a broadly accommodative or ‘de-risking’ approach that impedes more sophisticated and fine-grained changes in the organisation of financial governance.

The ‘de-risking state’ derives its name from the practice of states to prioritise policies that remove private sector risks from specific market segments, either by safeguarding
the value of systemic collateral or by enabling the creation of new asset classes as investment objects for private finance. As Gabor (2021b) shows, the de-risking state agenda is particularly visible in developing countries in which states increasingly reorient monetary and fiscal operations to create a safety net for (global) investors. State initiatives range from encouraging capital market liberalisation to directly underwriting private profits by protecting investors against demand risks (such as by guaranteeing a minimum level of demand for services), political risk (such as nationalisation or higher minimum wages), and currency and liquidity risks (through more traditional central bank operations). As others have shown, a similar logic is at play in advanced economies, for instance over climate regulation (M. Baer et al., 2021) or housing (Christophers, 2022). In the field of green finance, investment taxonomies and political guarantees are effectively designed to remove uncertainty from markets and cushion the effects of the low-carbon transition on existing business models. Overall, the de-risking state extends the operative logic of liquidity support beyond the usual confines of money markets and applies it to the capital accumulation strategies of financial capitalism more broadly.

The de-risking state’s concern with liquidity reflects the prominent role that central banks such as the Federal Reserve have assumed within macroeconomic management over the last decades, and the analogous rise of market-based finance. Through their lender of last resort function, central banks have always played a crucial de-risking function in money markets (C. Goodhart, 1988; Ugolini, 2017). Yet as market-based financial practices have increasingly linked capital market investments with money market funding, central bank policies have adjusted to accommodate a broader range of systemically interlinked asset prices (Mehrling, 2011). Since the global financial crisis, this broad-based support for asset prices proved increasingly difficult to be subsumed under the expansion of emergency facilities: the adoption of large-scale asset purchases or Quantitative Easing after the global financial crisis increasingly enmeshed monetary policy and financial stability functions in the support of liquidity. With regards to the former, QE can be considered a substitute for fiscal policies in inducing demand and stimulating the economy. With regards to the latter, QE functioned as a substantive support mechanism for critical asset prices—most notably, sovereign debt securities—that de-risked the operation of collateral-intensive finance on a sustained basis.
When discussing the expanded footprint of central banks within the market, political scientists and economists have primarily approached the expansive operations of central banks as a potential challenge to their political legitimacy: as central banks transcend the narrow boundaries of their official mandates, the basis for policy delegation itself is called into question (Lombardi & Moschella, 2017; Tucker, 2018). In turn, such political motives have often been interpreted as the key reason why central banks have been cautious in using their powers to shape markets. When faced with politicisation, policymakers are likely to retreat within the safety of their pre-existing mandates and stake their institutional status on current arrangements to preserve their political legitimacy (Adolph, 2013; McNamara, 2002). While there is certainly some purchase to such arguments, the focus on legitimacy alone cannot explain the sustained and expansive nature of liquidity support: far from limited to moments of overt crisis, liquidity interventions such as QE have become a systemic feature of central bank activities. Moreover, attempts on the part of central banks to unwind their large balance sheet and ‘normalise’ policy practices have largely failed—as I show empirically in chapters 5 and 6 of this thesis, in the case of the Federal Reserve policy normalisation ran into a series of difficulties that ultimately rendered the return to pre-crisis policy practices untenable. To make sense of the enduring logic of central banks’ de-risking operations, we thus need to look beyond arguments aimed at the external validity of such operations, and instead analyse their internal, operative logic.

Here the key argument I want to advance is this: instead of treating the Federal Reserve’s expanded balance sheets as an aberration, I suggest approaching it as the foundation for a de-risking approach to financial governance that seeks to obscure the contradictions of liquidity governance within market-based financial systems. As I have shown throughout this chapter, in contemporary markets liquidity emerges as a highly complex policy issue. It is precisely because the collateral-intensive nature of market-based finance enmeshes monetary-fiscal-financial concerns within the production of liquidity that it confronts policymakers with a ‘difficult-to-classify, difficult-to-isolate’ problem that cannot easily be subsumed within individual fields of policy and instead requires a coordinated approach (Wansleben, 2021, p. 914). On an operational level, liquidity governance increasingly affects the entire state apparatus, precisely because the money market activities of monetary policymakers,
financial stability regulators, and fiscal policymakers all impact on how financial actors operate, which actors gain in importance over time, and what trades they can conduct profitably. Put another way, it is precisely because demands for liquidity have grown in complexity under market-based finance that the established division of labour in governing liquidity is increasingly running into contradictions and tensions. For public actors, a key issue in problematising and devising market interventions is thus to negotiate the trade-offs between different policy domains. In line with Foucault’s (1984) approach of problematisations, in the governance of liquidity public actors thus must negotiate and reconcile complex institutional arrangements while responding to distinct social and political demands.

The idea that various policy fields face trade-offs when pursuing their objectives is of course nothing new. Indeed, disentangling different responsibilities for separate policy domains has often been understood as a way to avoid conflicts of interest; the delegation of specific responsibilities to delegated authorities such as central banks has occurred precisely to avoid time-inconsistent preferences and principal-agent problems, instead placing technocracy within accountability structures that prescribe explicit and monitorable tasks (Adolph, 2013; Winecoff, 2014). Yet the pretences of rigid, rules-based economic policy conducted by independent and apolitical technocrats has run into difficulties as markets have grown in complexity. As the successful implementation of policy requires monetary and fiscal authorities to govern through increasingly complex financial markets, the distinction between different policy objectives and market domains has become increasingly blurred. Under conditions of market-based finance, operating within highly interconnected and collateral-intensive markets thus has progressively eroded the operational independence of specialized agencies. As a result, this lack of an integrated governance strategy has created operational deficiencies: those modes of operation that are considered beneficial by public actors within specific state agencies can impede the operation of others.

The contradictions at heart of modern liquidity governance were neatly exposed by the global financial crisis. While finding alignment with liquid market structures had enhanced central banks’ monetary transmission mechanism before the crisis (Braun, 2020; Walter & Wansleben, 2020), the growth of collateral-intensive finance presented new financial stability challenges that ultimately could not be subsumed.
within existing microprudential stability mandates (Özgöde, 2021). To address systemic risks within markets, new regulatory approaches were needed (Baker, 2013). Yet the macroprudential reform project designed in the aftermath of the crisis created its own dilemma: at its most radical, macroprudentialism promised to curb shadow banking practices such as repo market intermediation that had served as a vital infrastructure for the transmission of monetary policy signals across credit markets. At the level of implementation, the key issue confronted central bankers and regulators was to find a compromise between dampening credit volatility and suppressing private credit flow/liquidity generation altogether.

At the level of money markets, the Federal Reserve thus faced an intensifying trade-off between the stability gains of macroprudential reforms and the market making capacities of global financial intermediaries. As I show in the later chapters of this thesis, for a time Quantitative Easing unintentionally helped obscure this dilemma by offering an enlarged central bank balance sheet as a viable mechanism to anchor (high-quality) liquid claims. At the same time, QE has functioned as an incredibly blunt tool: by making liquidity available on a systemic basis, it has allowed financial actors to develop new ways of putting this liquidity to work. Far from sitting ‘idle’ on its balance sheet, the dramatic expansion of Federal Reserve liabilities has engendered new market dynamics that support a variety of trading and arbitrage relationships within private markets, oftentimes generating new forms of interconnectedness and instability within the financial system as well as exacerbating the inequities associated with financialisation. As the Fed’s balance sheet policies thus took on an outsized importance for a growing number of market activities, private market demands for liquidity and existing policy modalities—the diverse demands of monetary, fiscal, and financial stability policy—became increasingly misaligned.

A key reason for this misalignment was that as a response to private sector liquidity needs, Quantitative Easing was articulated in relative isolation from the norms of fiscal or financial stability policy. The close infrastructural entanglement (Braun, 2020) of market-based finance and monetary governance has tended to displace fiscal and financial stability concerns precisely because they proved a poor fit for a market environment increasingly concerned with facilitating credit flow as its main policy avenue. Overcoming this imbalance has proven remarkably difficult: despite the increasingly obvious problems within the existing division of labour, policymakers
can see advantages in seeking to externalise and ignore problems such as liquidity if this is considered beneficial to their institutional legitimacy and their operational independence (Wansleben, 2021). In this context it is not a surprise that the more ambitious elements of macroprudentialism have been watered down at the stage of implementation: confronted with the need to radically reorient strategies of intervention and redevelop modes of coordination between different policy objectives, policymakers and regulators have tended to avoid such dilemmas by reverting to a ‘hands off’ approach to complex policy issues that places more emphasis on their market-accommodating, rather than market-shaping capacities.

The persistence of large central bank balance sheets thus reveals an intriguing paradox at the heart of the emerging de-risking state. As I show in chapter 5, the Federal Reserve sought to ‘normalise’ monetary policy after the global financial crisis precisely because it feared the overt politicisation of its outsized market interventions. Yet the idea of normalisation ran counter to complex post-crisis liquidity demands that could only be satisfied through either an accommodative central bank policy or greater monetary-fiscal-financial coordination in the governance of liquidity. Whereas the Fed’s enlarged balance sheet had thus initially functioned as a way to avoid difficult trade-offs in the governance of liquidity and render hard choices over the relationship between different policy fields invisible, the run-down of the Fed’s balance sheet worked precisely to bring these contradictions back to the fore—a process that ultimately prompted the Fed to engage in large-scale de-risking operations to compensate for the inadequacies of its governance framework. Due to the lack of a more integrated liquidity management strategy, expansive liquidity assistance thus emerged as the main remaining ‘thwarting mechanism’ (Ferri & Minsky, 1992) of today’s financial order.

3.5. Conclusion

The central argument of this chapter is that liquidity is a complex governance problem that requires a coordinated approach across different fields of government, including monetary policy, fiscal policy, and financial stability policy. I have developed this perspective through a careful reading of the role of liquidity in the relevant policy
literature, and in political economy scholarship within the tradition of Hyman Minsky. As I show, while these literatures offer a good grasp of endogenous liquidity events within collateral-intensive markets, they tend to think about the role of the state primarily in terms of its accommodative, backstopping role. While offering an excellent entry point to understanding the intricacies of (global) financial plumbing—and as such, a way to make sense of the systemic and pervasive role of speculative financial activity in contemporary society—they struggle to adequately incorporate traditional political economy concerns such as questions of profit, power, and macroeconomic outcomes.

To reintegrate these questions into the analysis, I have focused on the organisation of liquidity governance itself. In line with the research questions posed in this thesis—how the Fed governs contemporary money markets, what contradictions this governance strategy entails, and how it affects its crisis intervention capacities—I have approached the struggle for control between the state and finance over evolving economic dynamics not as a binary struggle between states and markets, but rather intimately tied up with the distribution of governance responsibilities between monetary policy, fiscal policy, and financial stability policy. The primary division of labour between these policy domains emerged out of the political and economic crises of the 1970s. I suggest that these arrangements are increasingly outdated for the governance of collateral intensive markets. In lieu of a broader reorganisation of policy, we thus witness an expanded role of central banks in de-risking economic activity across an ever-growing set of markets. Out of the dysfunctions of monetary governance, the central bank thus emerged as an increasingly comprehensive market backstop and a key de-risking agent of the state.

Having established the relevance of macrofinancial themes and developed a conceptual framework for making sense of the Fed’s money market strategy, the remainder of this thesis empirically interrogates the Fed’s macrofinancial role. Chapter 4 offers a historical overview over the Fed’s money market strategy, showing that it has tended to rely on markets to shore up its governance capacities. This strategy ultimately collapsed with the global financial crisis, forcing the Fed to come to terms with a significantly enlarged money market footprint. The following chapters detail its struggle to realign its policy apparatus with the post-crisis environment. As chapter 5 shows, a key problem for Fed policy in the post-crisis period was the insufficient
problematisation of changes within the macrofinancial architecture. Instead of pursuing a coordinated policy approach, Fed officials maintained the belief that monetary policy could and should be returned to pre-crisis practices as quickly as possible. As chapter 6 analyses, between 2015 and 2019 this approach progressively ran into difficulties and contradictions, forcing constant adjustments within the apparatus of monetary governance. Chapter 7 shows how this process of adaptation and institutional learning allowed the Fed to intervene decisively as a de-risking agent during the Covid-19 pandemic.
How did the Federal Reserve emerge as a successful macroeconomic manager of the US economy? In her seminal account, Greta Krippner (2011) explains the shift towards financialisation as the—partly unintended—consequence of a series of political decisions taken since the 1970s designed to meet social demands in a context of accelerating inflation and diminishing economic growth. Confronted with the gridlock of Congressional fiscal politics and a growing legitimacy crisis of the state, public actors—politicians, technocrats, central bankers—sought to mobilise financial markets as an indirect policy infrastructure for the allocation of credit through a series of regulatory and policy changes. Rather than taking responsibility and blame for worsening socio-economic outcomes, the shift towards governing “at a distance” through the market (Krippner, 2007, p. 506) helped depoliticise distributional conflicts while greatly enhancing the Federal Reserve’s economic steering capacity.

This chapter expands this line of inquiry by focusing more concretely on the transformation of the Fed’s governing practices. While Krippner’s account remains highly compelling, the focus on questions of political legitimacy arguably obscures the more intricate institutional reconfigurations necessary to turn finance into a viable policy infrastructure: in other words, it does not provide insights into the macrofinancial transformation of the Federal Reserve, and as such insufficiently explains how ‘practices of governing, regulatory frameworks, and processes of market coordination’ (Walter & Wansleben, 2020, p. 626) became entangled and aligned in such a way as to provide a suitable institutional foundation for the persistent financialisation of the US economy.

To provide such an account, the chapter traces the transformation of the Fed’s governing practices across a broader historical timeframe. While the present chapter revisits some of the same history already covered in the literature review (Chapter 2),
it does so by applying the theoretical and conceptual insights developed in Chapter 3. As a result, the discussion does not recount the historical transformation of macroeconomic governance, but rather focuses on the way in which the Fed’s money market strategy co-evolved with the American financial system. As such, the somewhat sweeping historical narrative in this chapter provides crucial background to the more intricate discussion of the contradictions in liquidity governance that the Fed confronted in the post-crisis period (see Chapters 5 to 7). The benefit of applying a macrofinancial perspective to the history of Fed policy is to illustrate how it managed to diffuse the contradictions of liquidity governance by extensively relying on private market mechanisms. Specifically, I show that turning money markets into a viable credit infrastructure required Federal Reserve officials to problematise liquidity within an evolving market landscape, rearticulate modes of interventions, and develop mechanisms to enlist financial practices as constitutive features in its monetary governance regime.

In reconstructing the Fed’s role within the transformation of the American financial system, this chapter begins by locating the 1966 credit crunch as an important juncture. As the first major credit contraction since the Great Depression, the event forced the Fed to problematise the interrelationship of its policy levers and account more concretely for their impact on money market practices. As Fed officials realised, for new money market practices to function as a dynamic source of growth for the economy, they needed to be embedded within a highly sophisticated and recalibrated governance apparatus. To that end, the Fed embarked on a protracted, decades-long struggle to align the technical conduct of monetary policy and financial stability policy with an evolving money market landscape.

By the 1990s, these changes had fuelled the financialisation of the US economy and spurred the growth of a market-based financial system highly dependent on wholesale money markets. Overlapping with Alan Greenspan’s Chairmanship and designated as the ‘Great Moderation’ by future Fed Chairman Ben Bernanke (2004), this period was characterised by relative macroeconomic stability (though not a decline in stock market volatility). Influenced by supply-side macro and monetary policies, the Federal Reserve operated under the assumption that once central banks assure price stability through short-term interest rate policy, markets will operate effectively and efficiently. Below the surface, however, the Great Moderation allowed for a significant build-up
of financial instability in the nascent shadow banking sector. While the role of (shadow) banking in the global financial crisis has been extensively discussed elsewhere (e.g. Gabor, 2016; Lysandrou & Nesvetailova, 2015; Murau, 2017; Pozsar, 2014; Tooze, 2018), I focus more narrowly on how the expansion of money markets and their significance for Fed policy rests on the institutionalisation of repo markets. In promoting repo markets, the Federal Reserve saw a way to enhance the efficacy of its monetary policy transmission mechanism, while relying on private market mechanisms to ensure the stability of the growing repo-dealer complex at the very heart of the US financial system—a strategy that ultimately failed with the global financial crisis.

The chapter proceeds as follows. The first section analyses how contradictions inherent in the Fed’s postwar monetary strategy contributed to the growth of a market-based financial infrastructure, most notably through the explosion of new bank liability management practices. These private banking practices in turn progressively undermined the Fed’s control over monetary conditions, setting up a struggle for control that broke out into the open during the 1966 credit crunch, which I identify as a key turning point in the Fed’s money market strategy. The following two sections discuss how the Fed subsequently rearticulated emergency lending, market regulation, and monetary policy during the 1970s and 1980s. Section four focuses on the crucial role of repo markets in sustaining the efficacy of the Fed’s monetary policy apparatus during the Great Moderation. The chapter concludes by discussing the global financial crisis.

4.1. The Federal Reserve’s postwar money market strategy and the 1966 credit crunch

During the Second World War and up until 1951, the Federal Reserve closely cooperated with the US Treasury in the support of US public debt. Monetary policy was limited to enforcing varying ceilings along the Treasury yield curve to limit interest expenses (Chaurushiya & Kuttner, 2003). Cooperation broke down after the uptick in inflation in the immediate post-war period. Following several months of intense interagency conflict, the Treasury and the Federal Reserve reached an
agreement in March 1951. Amongst other things, the Accord effectively separated debt management and monetary management and returned control over monetary policy to the Federal Reserve (Garbade, 2021).

Following the Accord, the Fed relied on a quantity framework of targeting bank reserve positions. In part, the quantity framework reflected the continued influence of Fed officials that had guided monetary policymaking during the 1920s and 1930s (Meltzer, 2009, pp. 43-45). Equally important was that Fed officials were keen to signal a clear break with the period of monetary-fiscal cooperation, during which the central bank had supported a fixed level of interest rates across the Treasury yield curve. Despite an awareness of the role of interest rates in the economy, Fed officials thus preferred a quantitative to an interest rate target, fearing that the latter would make it difficult to communicate a credible break with the strict rate pegging of the 1940s (Meulendyke, 1998). Between 1953 and 1960, this framework was reinforced through a policy stance that has become known as ‘bills only’, in which the Fed confined its open market operations to short-maturity Treasury securities, leaving longer maturity coupon securities free to trade without Fed interference (Bremner, 2004). As such, the Fed was sending a clear signal that it would not interfere with the private dealer system in shaping liquidity conditions for longer-term capital markets.

In operational terms, the Fed’s policy framework between 1951 and the 1970s relied on targeting ‘free’ reserves, i.e. excess reserves minus inter-bank borrowing. The idea of free reserves sought to combine qualitative control (over speculative lending) with quantitative control (by targeting a certain level of reserves). Rather than targeting reserves as such, the idea behind targeting ‘free’ reserves was to control those reserves that were not underpinning productive credit, and thus contributed to speculative financing activities. Through open market operations, the Fed could then manipulate money market conditions based on its interpretation of free reserves positions (Meltzer, 2009). Within this framework, Fed officials identified a relatively high level of free reserves with easy policy, as these reserves were expected to facilitate more speculative loans and investments. Conversely, the Fed considered low levels of free reserves, and accompanying bank reliance on discount window loans, as indicative of restrictive policy, as banks were lacking unpledged funds with which to expand lending (Meulendyke, 1998). What guided this approach was the idea that banks were keen to avoid indebtedness to the Federal Reserve; rather than freely borrow from the
Fed, banks would first liquidate assets to finance loan expansion, a process that would lead securities prices to fall and interest rates to rise. Banks would thus only revert to discount window borrowing once money market conditions had already tightened significantly (Meulendyke, 1988).

During the 1950s, Fed officials found this theoretical framework increasingly difficult to reconcile with the continuous increase in discount window borrowing. Banks had emerged from the war with balance sheets full of ‘safe assets’ such as government securities and cash-like assets such as deposit balances at other banks. To take advantage of the post-war economy, banks began to replace these safe assets with riskier ones, causing a sustained fall in the safe asset to loan and investment ratio (Wojnilower, 1980). Given large fluctuations in private market prices, banks started to rely heavily on the Federal Reserve’s discount window as a source of funds. Daily window loans, having largely disappeared after 1933, exceeded $1.5 billion by mid-1952 (Özgöde, 2021, p. 10). For the Federal Reserve, the growing reliance on the discount window was a rather unwelcome development. The problem was that as banks were converting their large holdings of Treasury securities into cash reserves via the discount window, the Fed became acutely entangled within the day-to-day liquidity management of the banking system. Instead of actively adjusting the pool of reserves through its open market operations, the Fed became a passive provider and insurer of market liquidity through its discount window. By acting as an endogenous source of market liquidity, the Fed’s discount rate came to displace market rates as the true refinancing rate of the financial system. Rather than anchoring expectations about longer-term refinancing costs within the institutional structure of the market, market rates came to depend on the refinancing conditions set by the Fed itself (Walter & Wansleben, 2020, p. 633).

By the mid-1950s, Fed officials were increasingly concerned that the disconnect between the Fed’s operating procedures and existing market structures would further inflationary and speculative pressure in the economy. The discount window had one major flaw: it assigned a purely passive role to the Federal Reserve. As long as banks could provide eligible assets, the Fed could not decline requests for liquidity. With bank borrowing surging, the Fed was thus likely to lose control over monetary conditions (Coleman et al., 1954; Özgöde, 2021). A 1955 revision to the Fed’s Regulation A, which governs discount window borrowing, sought to address the issue.
The revision emphasised that borrowing was a privilege and not a right: it was to be used only by banks facing a sudden change in the demand for credit. By creating more cumbersome administrative procedures and stigmatising the use of the window, the change was thus intended to persuade banks to rely on market mechanisms, rather than the outside credit supplied by the Fed. In purportedly removing the contradiction between window borrowing and open market operations, Fed officials believed that the latter could be undertaken with ‘a new degree of vigor and precision’ (Federal Reserve, 1971, p. 6).

As Fed officials would soon discover, stigmatising the discount window fuelled a dual process of regulatory arbitrage and financial innovation which in the long run would render the concept of free reserves increasingly untenable. As discount window lending attained less significance within the everyday operations of the banking system following the regulatory change, banks turned elsewhere to meet their liquidity needs, including through the issuance of short-term money market liabilities (Knafo, 2022; Konings, 2011; Wojnilower, 1980). Banks first turned to the federal funds market as the most efficient means of reserve adjustment. During the 1950s, trading volume grew sharply, with daily average gross purchases by large money centre banks reaching about $800 million by the end of the decade (Goodfriend & Whelpley, 1993, p. 18). At the same time, banks began to pioneer the use of overnight repurchase agreements to provide institutional non-bank depositors such as dealers with access to overnight money market instruments that paid a market rate of interest. While non-bank institutions were prohibited from participating in the Fed funds market directly, overnight repos allowed these actors to earn an overnight rate only slightly below the Fed funds rate. Through new trading practices, money markets were thus increasingly tightly interwoven in a complex web of credit relationships (Goodfriend & Whelpley, 1993; Minsky, 1957).

While new banking practices offered a way to ease liquidity needs without recourse to the discount window, the tight regulatory structure of American finance created another problem: disintermediation, that is the bypassing of financial intermediaries in favour of direct borrowing or lending in financial markets. The key problem for banks was that the New Deal’s Regulation Q on interest rate ceilings hampered the ability to offer competitive rates on deposits. The main idea behind Regulation Q was to regulate and stabilise the flow of credit in the economy. When inflationary pressures...
picked up, market interest rates would rise above regulated bank deposit ceilings, prompting depositors to seek alternative market funding mechanisms that promised higher yields. As capital flowed out of banks, lending from depository institutions to the broader economy slowed down. Regulation Q imposed restraint on the expansion of credit with ‘hydraulic efficiency’, and by imposing restraint early, it ensured that the resulting post-war recessions remained mild and brief (Krippner, 2011, p. 62; Wojnilower, 1980). Until the mid-1950s, banks benefitted from the rules as they effectively kept the cost for deposits low. Yet as the Fed gradually abandoned support for Treasury market and interest rates started to rise, large depositors, especially corporations, had little incentive to continue to park their cash in low-yielding bank deposits. As investments in short-term securities became more profitable than holding deposits with banks, banks found themselves increasingly squeezed for funds. What worsened the situation for banks was that in the late 1950s, American multinational corporations discovered the offshore Eurodollar market as a viable alternative source of borrowing. As the Eurodollar markets turned into another source of US bank disintermediation, banks were increasingly searching for new strategies to circumvent the legal restrictions that caused their deposit squeeze (Helleiner, 1994; Konings, 2007).

To meet this challenge, banks turned to active liability management and financial innovation. A key innovation in this regard were negotiable Certificates of Deposit (CDs) that enabled banks to finance their operations by borrowing in the money markets directly. CDs effectively functioned as a demand deposit alternative that could offer rates comparable to those of time deposits, and thereby allowed banks to attract corporate funds that had previously been lost in the process of disintermediation (Knafo, 2022; Wojnilower, 1980). Through the development of secondary trading on the wholesale market, CDs provided both liquidity and high returns to customers, and offered a stable source of funds for banks (Konings, 2007, p. 46). What started off as an emergency response to recoup lost funds thus quickly turned into a systematic strategy to fuel bank growth. Enhanced access to liquidity allowed banks not only to expand their own lending capacities but also to extend larger credit lines to other

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4 Traditional demand deposits generated no interest but allowed daily redemption, whereas time deposits provided interest but kept funds inaccessible until maturity.
lenders such as thrift and insurance companies that were engaged in riskier business models than banks (Wojnilower, 1980).

While active liability management provided significant advantages to banks, new products such as CDs needed to offer competitive market rates to attract inflows. Throughout the early 1960s, the competitive money market environment thus slowly pushed interest rates higher until in the mid-1960s, the Fed funds rate rose above the discount rate, first in 1964 and more persistently in 1965 (Meulendyke, 1998, p. 38). As Fed officials discovered, active liability management turned the concept of free reserves into an increasingly less predictable indicator of bank credit growth: individual banks could expand credit even without free reserves if they were willing to bid aggressively for wholesale funds. As wholesale funds such as Fed funds were not subject to restrictions on prolonged use that were applied to the Fed’s discount window, liability management techniques were progressively limiting the Fed’s control over credit expansion itself. Banks could thus extend significant amounts of credit without consideration of the Federal Reserve’s monetary policy stance (Klopstock, 1968; Konings, 2011; Krippner, 2011).

For the Fed, the expansion of liability management techniques presented a clear dilemma. While slowly losing control over credit conditions, Fed officials were aware that any attempt to exert control over bank liability management practices would have been extremely costly given that the increasing integration of financial markets amplified the risks of recessions that would result from any attempt to discipline credit expansion. The embeddedness of CDs, for instance, made it likely that any move to restrict their use would cause a serious financial crisis. As the Fed prevaricated between stifling economic growth and constraining liability management practices, it became increasingly difficult to enforce discipline on financial market actors that operated under the assumption that refinancing liquidity would always be available from the Fed. With market expectations increasingly grounded in a widely shared belief that the Fed would accommodate market practices, credit expansion came to fuel inflationary tendencies in the economy (Konings, 2007).

In 1966, political pressure as well as its own growing concern with inflation prompted the Fed to resist market practices more actively. By refusing to raise interest rate ceilings on bank deposits and CDs alongside other market rates, the Fed effectively limited the attractiveness of bank liabilities for other money market participants and
incentivised them to rotate out of bank liabilities and into other, more lucrative investments (Klopstock, 1968, p. 135). As banks found themselves virtually priced out of domestic money markets, they experienced a severe credit crunch in domestic markets. With bond market liquidity in question, a record decrease in inflows into banks, and a resulting squeeze on bank lending that became especially acute in the residential construction sector, Fed officials themselves were taken by surprise by the severity of the market slowdown (Burger, 1969; Wojnilower, 1980). A significant consequence of the Fed’s policy-induced credit crunch of 1966 was the expansion of banks into the offshore Eurodollar market. Keen to emancipate themselves from the Fed’s reach, banks dramatically increased their Eurodollar liabilities from about $2 billion in 1967 to $13 billion in 1969. The expansion of CD markets into the Eurodollar market intensified the links between onshore and offshore markets as banks increasingly channelled funds between their branches in different jurisdictions (Burger, 1969). Instead of mitigating the problem of increasing interconnectedness, the credit crunch of 1966 thus facilitated an explosion on liability management far beyond its original reach. By tapping offshore funds for domestic use, banks were now capable of circumventing the Fed’s attempts to contain inflation through control over the creation of credit and money (Konings, 2007).

The 1966 credit crunch brought the problem of Fed policy to the fore. Not only had the growing interconnectedness of the financial system made credit crunches more likely and endemic to financial development, but the Fed’s policy apparatus also appeared wholly inadequate to pre-empt or diffuse such developments. As the financial system was growing into an increasingly adaptive and dynamic source of credit for the economy, the Fed was slowly losing control not just over financial stability, but over the process of credit creation itself. While the Fed could ease financial conditions, it had extremely limited tools to tighten market conditions without directly feeding recessionary impulses in the economy. As such, the Fed’s existing policy apparatus proved inadequate to accommodate pressures within the existing macrofinancial architecture. What was needed, in other words, was a mechanism to credibly impose discipline on financial actors—a dilemma that would haunt monetary policy in the years to come as inflationary pressures picked up across the economy.
Curiously, the dilemma signified by the 1966 crunch has largely evaded the political economy literature on the Federal Reserve (for a notable exception, see Özgöde, 2021). Konings (2007, 2011), for instance, discusses the crunch in relation to the expansion of the offshore Eurodollar market, but not in terms of its effects on the domestic operations of the Fed. Similarly, Krippner (2011) locates the Fed’s struggle with inflation firmly in the 1970s and misses the importance of the 1966 episode. Yet as I will show in the next section, the experience of the 1966 credit crunch played a crucial role in the reinvention of the Fed’s emergency policy apparatus and triggered a prolonged process of experimentation to realign its policy levers with a shifting market environment.

4.2. The Fed’s emergency lending apparatus in a shifting regulatory environment

Following the 1966 credit crunch, the interconnectedness of the financial system intensified as banks and non-banks increasingly relied on money markets for their funding needs. While these markets were becoming an important infrastructure for the allocation of credit and thus could serve as a potential lever for macroeconomic policy, policymakers saw two distinct difficulties in relying on the market mechanism: first, to rely on finance as vital infrastructure, the growing complexity of financial networks and associated financial vulnerabilities needed to be addressed. As funding crunches in specific sectors or institutions could easily be translated into a broader liquidity event within financial markets, banking institutions required safeguards and backstop guarantees to expand their activities reliably. The second problem related to financial market structure: access to money market funding was highly unequal, with larger banks dominating new forms of liability management that were often too sophisticated for smaller and rural banks. As such, access to finance was becoming increasingly bifurcated, threatening to cut off significant swaths of the country from easy access to credit. To address these challenges within the macrofinancial architecture of the US financial system, the Fed along with other public actors initiated a series of changes both to the Fed’s emergency lending apparatus and to the regulatory structure of finance.
4.2.1. The reappraisal of the discount window

The first significant change occurred to the Fed’s emergency lending mechanisms. By the time of the 1966 credit crunch, the Federal Reserve had already begun to reassess its discount window practices. Initiated in 1965, a study of the discount window was seeking out new ways to transform the window into a mechanism to improve the ability of banks to allocate credit. Given the disintermediation tendencies of financial structures, Fed officials were particularly concerned that rural and local banks that lacked the sophistication to engage in money market liability management were reluctant to take on risks, and as such lacked the funds to meet the credit needs of large parts of the country. Innovations in liability management had shown that financial markets could serve as a dynamic source of credit and growth, if calibrated correctly. To facilitate such an outcome, the initial goal of the study was to repurpose the window into a tool to encourage bank lending and maximise growth via the supply of credit (Özgöde, 2021). This position was antithetical to the reforms of Regulation A instituted in 1955 which had effectively stigmatised the window, and which Fed officials were now blaming for the acute undersupply of credit (see for example Hackley, 1973).

Following the 1966 crunch, the project expanded its scope to emergency credit assistance more broadly. As the study noted, the need for such interventions had increased in urgency after the 1966 crunch had revealed the dangers of increased interdependence and interaction of previously disparate financial actors. Realising the broader role that the Fed could play in mitigating liquidity crunches in the financial economy, the study—first published in 1968—defined the Fed as ‘the ultimate source of liquidity to the economy’ (Federal Reserve, 1971, p. 18), responsible for supplying funds during ‘general or isolated emergency situations’ (Federal Reserve, 1971, p. 4). By drawing a distinction between general and isolated liquidity events, the Fed study further sought to disentangle the relationship between OMOs and discount window lending. In clearly ascribing primacy to the former, the study highlighted that discount window lending should cushion adverse swings in reserve positions yet without being so large as to offset the effects of open market operations itself.

The significance of the Fed’s recalibration is often overlooked. In essence, the Fed sought to develop means to impose discipline across the economy: as the 1966 credit crunch had shown, in an interconnected financial system an adverse change in
refinancing conditions can have broader repercussions on economic activity than is
desired by the central bank. Recalibrating the discount window thus was conceived as
a way to counter these negative pressures, effectively providing a mechanism to
relieve the pressures of monetary policy tightening at key nodal points through
targeted lending. Within this framework, OMOs thus were intended to affect broad-
based liquidity conditions through the injection or withdrawal of reserves, while
window borrowing would prevent more limited and localised disturbances that
resulted from such changes from disrupting the broader financial system:

Under present conditions, sophisticated open market operations enable the System to head
off general liquidity crises, but such operations are less appropriate when the System is
confronted with serious financial strains among individual firms or specialized groups of
institutions. At times such pressures may be inherent in the nature of monetary restraint,
in the sense that monetary policy actions, no matter how impersonally applied, often have,
in fact, excessively harsh impacts on particular sectors of the economy. At other times
underlying economic conditions may change in unforeseen ways, to the detriment of a
particular financial substructure. And, of course, the possibility of local calamities or
management failure affecting individual institutions or small groups of institutions is ever-
present. It is in connection with these limited crises that the discount window can play an
effective role as ‘lender of last resort’. (Federal Reserve, 1971, p. 19)

To enhance the effect of emergency credit assistance, the study recommended to
expand the activities of the discount window beyond banks that were members of the
Federal Reserve System. While the window should always be available to member
banks, in its capacity as lender of last resort the Fed should be able to lend to other
institutions, though only under certain circumstances justified by the ‘probable impact
of failure on the economy’s financial structure’ (Federal Reserve, 1971, p. 20).
Codified in law in 1973 in a revision of Regulation A, the new framework established
the Fed as the ultimate source of liquidity for the financial system (Hackley, 1973, p.
197).

From the 1970s onwards, the Fed’s lender of last resort framework would be tested
comprehensively (Aquanno, 2015; Brimmer, 1989; Özgöde, 2021). The Fed early on
established two key practices: containment and controlled mergers. The former was
first used during the failure of Penn Central in 1970. As a non-bank heavily involved
in the Commercial Paper market, Penn Central occupied a critical position within the
market, yet lacked the creditworthiness needed to qualify for a Fed loan. To achieve a
workaround, the Fed decided to lend to commercial banks instead: while banks had to
take on the credit risk of lending in the commercial paper market, the discount window
stood ready to provide liquidity as needed. By facilitating the continued flow of credit from the banking sector to the non-financial economy, the Fed’s solution thus effectively contained the fallout from Penn Central’s default (Brimmer, 1989).

The second mechanism, controlled mergers, was first trialled during the 1974 collapse of Franklin National Bank, which had seen catastrophic losses on its speculative foreign exchange book. Given the Bank’s tight integration into international currency markets, its failure threatened a broader crisis in both domestic and offshore dollar markets. In light of its systemic integration, the Fed decided to temporarily prop up the bank through a $1.7 billion loan package until its operations could be merged with other banks. While lending to an insolvent bank presented a new development for the Fed, Fed officials justified the practice with a nod to the bank’s ‘highly developed network of banking relationships’ which extended not just into FX markets, but also into domestic Fed funds and CD markets (Brimmer, 1989, p. 4). Following the collapse of the German Bankhaus Herstatt a few months later, the Fed found its emphasis on the interconnectedness of the international payments system justified. Herstatt’s abrupt bankruptcy left a string of unsettled FX trades throughout the international banking community that caused a severe and sudden liquidity squeeze for a number of major US and British banks that had operated in the Eurodollar market. Faced with the sudden stop in international FX trading, the Fed reprimanded the Bundesbank for failing to intervene in a manner similar to its own actions on behalf of Franklin National, and subsequently pressured the Bundesbank to assume responsibility for Herstatt’s debt (Aquanno, 2015).

The failure of banks involved in foreign exchange trading reflected significant changes in the international monetary order. During the late 1960s, the growth of Eurodollar markets and continued dollar outflows had put growing pressures on the Bretton Woods system of fixed exchange rates, until President Nixon delinked the dollar from gold in August 1971 amidst fears of a dollar crash. Private international capital flows quickly picked up and accelerated dramatically after the 1973 oil shock. While public officials had initially favoured Petrodollar recycling through public channels, the US Treasury heavily lobbied for private market recycling of these flows, hoping that increased foreign dollar holdings would entrench foreign demand for the growing deficits incurred by the Nixon and Ford administrations (Helleiner, 1994; Kapstein, 1994; Spiro, 1999). Internationally, the Treasury’s actions were highly contested.
Following the oil shock, several developing countries were experiencing sudden balance of payments difficulties (Kershaw, 2018; Lissakers, 1991). Leaving their access to capital up to market forces appeared far from certain to guarantee sufficient capital flows. In championing private market recycling of petrodollars, the Treasury thus found itself in direct opposition to Japan and Western European countries that favoured multilateral recycling through the facilities of the IMF (Kapstein, 1994).

The move to private Petrodollar recycling marked an important shift in the international regulatory community’s approach to global financial stability. Rather than seeking to balance international money flows through interstate cooperation, the process of Petrodollar recycling came to rely on private sector risk management techniques (Braun et al., 2020). At the time, banks themselves were dubious about their ability to recycle capital flows without assuming undue foreign exchange risks.

In the wake of the failures of Bankhaus Herstatt and Franklin National in 1974, interbank trading was at a low. Banks recognised that recycling would require accepting short-term OPEC deposits and lending out long-term for balance of payments purposes and were unwilling to take on the resulting maturity mismatch without lender of last resort commitments from their home governments and substantial tax incentives (Kershaw, 2018, p. 305; Lissakers, 1991). To accommodate such concerns, the emerging policy consensus saw the gradual expansion of the Eurodollar’s backstop infrastructure as central banks settled into a more hands-off form of international monetary management. In 1974, implicit lender of last resort commitments were provided by G-10 countries through the Basel Concordat (Braun et al., 2020; Kapstein, 1994).

With the Treasury taking the lead on international policy, the intensification of cross-border financial relations presented considerable problems for the Federal Reserve’s domestic money management. Given the protean nature of finance, central bankers were unsure whether Eurodollar deposits, money market funds shares and other forms of credit should be counted as money (Burns, 1979). At the same time that changes in financial structure were putting the efficacy of monetary policy tools into question, the proliferation of financial instability posed a growing legitimacy challenge to the Fed: with crises no longer confined to the traditional banking sector, interventions required careful justification (Özgöde, 2021). Throughout the 1970s and 1980s, the Fed was effectively engaged in a process of institutional learning and adaptation as it
problematised the consequences of individual bank failures on an increasingly integrated financial structure (Aquanno, 2015). The Fed’s function as lender of last resort was increasingly called upon: during the 1980s, 1037 commercial banks failed (Knafo, 2022). Troubled small banks were either merged with larger ones or, if that proved impractical, closed by the Fed and the Treasury, with depositors paid off by the FDIC, until FDIC funds were virtually depleted.

Meanwhile, larger banks were bailed out by the Fed directly. The trouble for the Fed was determining which banks were systemically important. The problem became obvious in 1982, when the decision to close a small Oklahoma bank endangered the operations of Continental Illinois, the seventh-largest commercial bank in the country. After liquidity assistance from the Fed and several large banks proved unsuccessful in preventing a run on the bank, the FDIC committed to purchasing $4.5 billion in bad loans from the bank and bail out its creditors (Mayer, 2001). Most controversially, the FDIC committed to supporting creditors that were not normally protected from bank failure, including those with funds exceeding standard deposit insurance. Acting in agreement with the Treasury and the Fed, the FDIC’s actions came to be seen as guaranteeing a new form of bailout: that of banks that were, in the words of the Los Angeles Times, ‘too sick to thrive, but too big to fail’ (cited in Özgüde, 2021, p. 22). In Congressional hearings after the event, the Treasury’s comptroller made it clear that regulators were unlikely to let the nation’s eleven largest banks fail. Despite concerns about double standards expressed by the media and smaller banks, too big to fail was here to stay.

While politically controversial, the too big to fail logic signified the continuation of a trend. Concerns about interdependence, increasingly framed within the language of systemic risk, had haunted Fed and Treasury officials since the late 1960s. To cushion systemic volatility, the banks that were designated too big to fail in 1984 had already received considerable indirect bailouts in preceding years. During the emerging market debt crisis of the early 1980s, the Treasury and Fed committed to rescuing those foreign banks that significant exposure to Mexico’s debt and coordinated with foreign central banks to safeguard major banks involved in Petrodollar recycling (Kapstein, 1994; Konings, 2011). Yet while these international activities had evaded public scrutiny, the failure of small domestic banks, coupled with a too big to fail logic for multinational banks, prompted broader questions about the remit of bailouts. In
1991, Congress attempted to limit rescues of too big to fail banks through the Federal Deposit Insurance Corporation Improvement Act. Yet after pressure both by the administration and the Federal Reserve, lawmakers inserted a systemic risk exception into the law (Özgöde, 2021). While bailouts had come with high political cost, the Fed now had secured its capacity to act decisively whenever it considered the safety of the broader financial system at stake.

4.2.2. Market structure and financial vulnerability

While the progressive expansion of emergency lending powers allowed the Fed to mitigate and contain liquidity events in increasingly interdependent financial markets, officials increasingly came to see the regulatory structure of financial markets as a key contributor to financial volatility. Indeed, the financial system was increasingly operating in a fashion that closed off credit for significant parts of the economy.

The decisive issue was once again disintermediation. As I have already shown, New Deal Regulations such as the Regulation Q interest rate ceilings played an important role in stabilising the flow of credit in the economy. Yet during the 1970s, the role of Regulation Q increasingly began to malfunction as inflation became entrenched. As banks’ competition for funding pushed interest rates consistently above Regulation Q ceilings, smaller banks as well as savings and loan associations found themselves increasingly priced out of funds (Krippner, 2011). By the early 1970s, the funding squeeze contributed to the financial difficulties of state and municipal governments including New York City, whose bond sales were regulated by usury limits (Phillips-Fein, 2017). While credit was thus becoming a scarce commodity across most of the economy, large banks and corporations could borrow without restraints in the money markets in a process that was contributing to inflation. In seeking to curb those practices, the Fed soon found that its ability to impose restrictive policy on major banks was severely limited (Mayer, 2001). Whenever the Fed sought to introduce reserve requirements on specific types of instruments held by banks, banks responded by exiting the Federal Reserve System and continued to operate under a state charter. As a result, ever-larger swathes of the financial system were located outside of the Fed’s control and engaged in increasingly complex financial intermediation techniques (Konings, 2011, p. 127).
Confronted both with a credit squeeze across many parts of the economy, and the rapid financialisation of money market trading activities, politicians and technocrats across the US state sought to realign the structure of the US economy more broadly. The first intuition was to experiment with credit allocation schemes that were designed to control the flow of credit across the economy more proactively. Between the mid-1960s and mid-1970s, such schemes were common features on the legislative agenda. The basic idea was that just as government controls in the form of Regulation Q were distorting the flow of credit, government could take remedial action to counteract the distortion. Yet the problem, as Krippner’s (2011) seminal account shows, was that legislators were loath to take responsibility for suboptimal outcomes. Within the high-stakes game of Congressional budget politics, few were keen to be seen as responsible for directing the flow of credit away from some sectors of the economy and towards others.

The alternative was to shift responsibility for the credit allocation mechanism to the market. Already in 1968, Congress had reorganised the New Deal system in housing finance policy by spinning off its mortgage-purchasing entity Fannie Mae and authorising it to engage in securitisation (Quinn, 2017). In the 1970s, Congress entered a prolonged political process to restructure regulatory policy and remove interest rate ceilings—against significant opposition from parts of the financial sector, the housing industry, and organised labour (Krippner, 2011). From the perspective of the Fed and Congress, reforms were not an abandonment of regulation but served to remove obstacles to credit allocation that no longer fulfilled a productive purpose. The programme of re-regulation was implemented through two key pieces of legislation. The 1980 Depository Institutions Deregulation and Monetary Control Act and the 1982 Garn-St. Germain Depository Institutions Act relaxed Regulation Q interest rate ceilings and opened up new sources of funds for depository institutions. By expanding deposit insurance and reserve requirements across all depository institutions, the legislative changes further enshrined the control of the Federal Reserve over the banking system as a whole and eliminated the threat of bank exit from Federal Reserve supervision. Through these changes, banks and thrifts were now better able to compete with large banks for money and capital market funds, making the danger of disintermediation less relevant (Konings, 2011, p. 135).
The recalibration of the domestic regulatory structure mirrored the shift to private market mechanisms in the offshore Eurodollar markets that occurred in the early 1970s. In both instances, policymakers initially sought to embed markets within a structure of regulatory mechanisms designed to rebalance money flows between national economies or domestic sectors. As the process of financial innovation was increasingly disrupting the functioning of these settings, policymakers re-problematised the market structure and engaged in a protracted process to rearticulate the regulatory landscape. In both cases, the result was a move away from targeting aggregate credit imbalances and towards the optimisation of firm-level risk management, reflecting a microprudential approach to financial regulation (Vestergaard, 2009). Following the Latin American debt crisis and a series of banking failures in the 1980s, these regulatory standards were streamlined and standardised in the 1988 Basel Accord. As regulators noticed, greater competition and falling profits amongst banks had contributed to excessive risk taking and facilitated an international race to the bottom in regulation, leading banks to run down their capital ratios drastically (Capie et al., 1994). The Basel Accord effectively sought to counteract this development without suppressing banks’ lending activities: to increase the safety and resilience of individual institutions, the Accord repurposed bank capital as a shock-absorption mechanism against aggregate risks in the international economy (C. Goodhart, 2011).

While intended to optimise firm-level risk, the Accord suffered from two significant shortcomings: first, banks started to rely on leverage and securitisation techniques to overcome capital requirements (Lockwood, 2015; Thiemann, 2018); and second, by focusing on capital rather than liquidity requirements, the Accord effectively endorsed banks’ practice of minimising their holdings of low-yield but highly liquid assets. The capacity of banks to reduce their liquidity is premised on implicit lender-of-last-resort commitments: the greater the potential for government support, the lower the liquidity buffers that banks feel necessary to entertain (Davies & Green, 2010). Throughout the late 1990s and early 2000s, banks’ incentives to hold liquid assets decreased even more as, under the so-called Greenspan Put, the Fed seemed ever more willing to support markets with liquidity: in effect, the Fed was beginning to move towards a broader ‘de-risking’ logic in which it would progressively compensate for the
instabilities that were a consequence of a more flexible financial structure. It is towards these monetary policy choices that I turn next.

4.3. The Volcker shock and the transformation of monetary policy

The recalibration of the regulatory structure and the enhanced emphasis on bank-level risk optimisation provided an important impetus for the financialisation of the economy throughout the 1980s and 1990s, but it must be understood in the context of the transformation of US monetary policy.

During the 1970s, the Fed adapted its monetary policy apparatus several times in response to mounting inflationary pressures. Experimenting with other quantity indicators than free reserves, Fed officials showed considerable differences in opinion regarding the relative importance of monetary aggregates, interest rates, macroeconomic factors, and money market conditions (Goodfriend, 2007; Hetzel, 1981). As the techniques for setting and pursuing monetary policy developed gradually during the decade, Fed operations shifted towards setting a monetary objective and encouraging the Fed funds rate to adjust accordingly (Meltzer, 1991). The Fed first set long-run targets for the rate of growth of the money supply in 1970, a practice that became mandated by Congress in 1975. In its operations, the Fed soon encountered the problem of ‘base drift’, as quarterly set money base growth targets were missed and deviations from previously targeted values incorporated into the new base (Hetzel, 1981; Meulendyke, 1998). As growth targets moved in line with misses, they failed to function as reliable benchmarks for assessing trends in money supply. Money growth targets were missed because the Fed failed to use open market operations aggressively to counter deviations from its target. To tightly control base money, the Fed would have needed to allow violent swings in short-term interest rates, potentially disrupting financial intermediation and forcing the economy into a recession. Keen to avoid such an outcome, the Fed limited shifts in Fed funds targets to a narrow band (Hetzel, 1981).

A key problem was that within the Fed’s procedures, the money supply and short-term interest rates became entangled as the operational target of monetary policy. As the Fed viewed short-term interest rates as an intermediate target of monetary policy, it
feared that wild fluctuations in interest rates could lead to misinterpretations regarding the future course of monetary policy (Goodfriend, 2007; Walter & Wansleben, 2020). To smooth interest rate fluctuations, the Fed thus undertook accommodative open market operations to keep the discount rate and the Fed funds rate closely aligned. By tracking variations in discount rates and their expected effect on the future monetary policy stance, market actors could anchor their long-term refinancing expectations within the Fed’s policy practice of ‘interest rate smoothing’, rather than within market processes (Hetzel, 1981). While touted as a mechanism to shift the Fed funds rate in line with long-term money growth targets, open market operations thus equally served the purpose of keeping short-term interest rates aligned and provide stable financing conditions for financial actors. In intertwining these two purposes, open market operations ‘could only fortuitously produce control of the money supply’ (Hetzel, 1981, p. 40) and failed to reign in inflationary pressures.

In essence, the realignment of discount window practices and open market operations initiated in 1970 had failed to achieve its main purpose. As discussed earlier in this chapter, the often-ignored reappraisal of the discount window was motivated by a desire to use discount window lending as a targeted mechanism to diffuse pressures within the financial structure that would result from a tightening in the monetary policy apparatus. Yet within the Fed’s everyday operating procedures, the two rates lacked independence and clarity of purpose: as open market operations remained closely aligned with discount rates, the two mechanisms came to feed off each other, rather than provide a countervailing and stabilising force.

The Fed’s shift in monetary policy practice from 1979 to 1981 under new Fed Chairman Paul Volcker can be interpreted as an attempt to resolve the contradictions resulting from the entanglement of operating procedures (Walter & Wansleben, 2020). On October 6, 1979, the Fed dropped its short-term interest rate target to concentrate on the money supply. The policy shift has generally been associated with a tactical embrace of monetarist ideas to break inflationary pressures in the economy (Krippner, 2011). While Fed officials were highly sceptical of their ability to control the money supply accurately, targeting monetary quantities rather than interest rates directly provided policymakers with the cover to let interest rates rise dramatically. Causing the heightened volatility in interest rates that the Fed had previously shied away from,
the ‘Volcker shock’ plunged the economy into a deep recession, though it proved effective in curtailing inflation.

On an operational level, the Fed’s shift from interest rate targeting to targeting the money supply prompted a shift in operating procedures whereby non-borrowed reserves became the system’s target variable. The Fed now effectively sought to translate quarterly growth rates for monetary aggregates into practical daily objectives for its trading desk (Feinman & Poole, 1989). The Fed would provide precise quantities of non-borrowed reserves through its open market operations, allowing banks to bid up market rates in competition for this pre-set volume of reserves. In practical terms, this meant that as quantities of non-borrowed reserves were fixed in line with money growth targets, banks needed to resort to discount window borrowing for additional ‘off-path money’ growth, forcing a change in borrowed reserves (Goodfriend, 1983; Hetzel, 1982). As the Fed continued to limit discount window lending through non-pecuniary measures, elevated window borrowing would feed through to the Fed funds rate. The resulting fluctuations in the Fed funds rate thus could be presented as automatically engendering the necessary interest rate response to off-target money growth. It was this automaticity of the interest rate response (Feinman & Poole, 1989) that allowed the Fed to generate ‘an observable price-effect as a consequence of more restrictive open market trading’ (Walter & Wansleben, 2020, p. 636), and thereby re-anchor intertemporal expectations regarding the cost of liquidity within a purportedly market-led interest rate mechanism (Krippner, 2011).

The monetarist experiment was not without troubles. In light of the unstable relationship between quantities and rates, targeting quantities introduced considerable interest rate volatility that tested policymakers’ commitment as well as markets’ ability to make sense of the Fed’s policy strategy (Best, 2020). Particularly troubling for the Fed was that targeting of non-borrowed reserves did not translate into actual control over monetary quantities. Bank credit continued to expand as banks were able to raise ample funds both at home and in the Eurodollar markets, precisely because high interest rates were drawing funding into US markets (Konings, 2011; Wojnilower, 1980). Yet in terms of its inflation management, the Fed got lucky: dovetailing on the regulatory changes of the early 1980s and the subsequent intensification of liability management techniques, inflation increasingly manifested itself in the financial economy, rather than in the real economy. The high interest rate
regime had caused a recession in the real economy; as banks continued to raise funds at high costs, it now primarily fuelled asset prices. The key effect of the monetarist experiment thus was to transform consumer price inflation into asset price inflation (Konings, 2011, p. 137). Yet as liability management techniques consistently improved financial liquidity and thereby undermined any robust and durable link between monetary aggregates and financial activity, the Fed began to abandon its monetarist strategy.

The switch in 1982 to borrowed reserves set the Fed on a path to return to interest rate targeting and discard the emphasis on increasingly meaningless monetary aggregates. Instead of constituting a direct shift to interest rate targeting, however, the new operating procedures allowed the Fed to maintain some ambiguity regarding its rate target (Hetzel, 2008; Krippner, 2007; Walter & Wansleben, 2020). Under borrowed reserves targeting, the Fed supplied insufficient amounts of non-borrowed reserves through its open market operations to force banks to revert to the discount window for additional borrowing. With window borrowing rationed, shifts in the discount rate incentivised banks either to draw on the window or rely on the Fed funds market, depending on calculations regarding the future expected path of interest rates and their own expected future needs for window borrowing. By exploiting the close relationship between discount rate and Fed funds rate, the borrowed reserves regime thus allowed for the indirect targeting of the Fed funds rate while maintaining some separation between the actions of the Fed and rate movements. In this way, ‘the Fed could raise short-term interest rates and attribute the rise to market forces’ (Hetzel, 2008, p. 191). Instead of communicating a rate target and relying on open market operations to enforce this target, the Fed allowed rates to fluctuate around an unstated target associated with a given amount of discount window borrowing. Rather than being seen as fixing market rates, the Fed funds rate thus appeared free from Fed influence and credibly anchored within market expectations (Goodfriend, 2007; Krippner, 2007).

In the mid-1980s, the Fed gradually phased out borrowed reserves targeting and began to set a target for the Fed funds rate directly. The shift was motivated by deepening problems resulting from the continued entanglement of the discount window with monetary policy signals under the borrowing reserves regime. During the 1980s, bank failures triggered increasing recourse to the discount window for emergency loans, and as a result, the growing association of window lending with financial distress made
banks less willing to extensively rely on window borrowing for normal market operations. Following the October 1987 stock market crash, the contradictions inherent in this position became untenable. The practice of camouflaging intentions regarding the Fed funds rate behind borrowed reserves targeting turned into a liability once the Fed sought to provide a credible backstop commitment to markets. In the weeks following the stock market crash, the Fed thus reverted to directly targeting the Fed funds rate (Krippner, 2007).

Targeting the Fed funds rate directly allowed the Fed to communicate its monetary policy intentions more clearly. As Fed officials soon discovered, the high degree of market depth and connectivity that had resulted from the increasing financialisation of the economy meant that short- and long-term interest rates were increasingly integrated. Bond traders proved highly sensitive to Fed fund changes, thereby shortening the lag in transmission between rates. As long-term rates moved quickly in response to Fed policy, Fed officials realised that they could credibly shape market expectations through signalling their intentions. In 1994, the Fed moved to announcing Fed funds targets directly in a bid to enlist markets in achieving said targets (Krippner, 2007). As market actors increasingly responded to announcements by adjusting behaviour even before the Fed had undertaken any concrete policy action, the tone and wording of policy directives and statements by the Fed Chairman Alan Greenspan became important policy instruments (Mayer, 2001).

Entering the Great Moderation, the Fed had thus established a purportedly stable governance framework. By manipulating relatively scarce bank reserves through policy announcements and open market operations, the Fed could effectively influence short-term interest rates in the Fed funds interbank market, and through a network of arbitrage relationships it could count on such monetary policy changes to translate efficiently into broader interest rate changes across money markets and the broader economy. Open market operations now were the preferred policy instrument, and during Greenspan’s tenure at the Fed they took on a near universal role. In what has widely been dubbed the ‘Greenspan Put’, the Fed shifted to an accommodative open market stance whenever prices began to slide, thus providing a sense of safety to investors that asset prices would at worst plateau, but never really drop. While never explicitly formulated by Greenspan as a policy guideline, Wall Street soon accounted
for the Greenspan Put as an integral part of US monetary policy, and adapted trading strategies accordingly (Watson, 2014).

4.4. Governing financialised capitalism: the role of repo markets

By the 1990s, the Fed appeared to have successfully realigned its monetary policy operating procedures with the broader macrofinancial architecture. After reconstituting its emergency mitigation apparatus in the early 1970s, the monetarist experiment of 1979-1982 offered the preconditions for the subsequent disentanglement of the discount window from the conduct of monetary policy by anchoring the latter credibly within the market. The shift in monetary policy, now squarely oriented around short-term interest rate targeting, was helped by regulatory changes that removed rigidities from the financial structure and facilitated the growth of asset/liability management practices reliant on private sector, firm-level, risk optimisation strategies. While increasing financial instability, the tight integration of markets through a highly integrated structure of financial arbitrage allowed short-term interest rate changes to be transmitted quickly across markets. Under the new institutional arrangements, the Fed extensively relied on open market operations to implement monetary policy and forestall volatility in asset prices: in effect, the Fed shifted towards de-risking finance via accommodative policy whenever problems within the financial structure arose.

Following the experience of the global financial crisis, it is now apparent that the Fed’s policy mix allowed the build-up of excessive financial instability, most notably in the nascent shadow banking sector. The crisis thus invalidated the belief, incorporated in inflation targeting, that once central banks assure price stability, markets will operate effectively and efficiently. Instead, the new funding structures and resultant interdependencies fostered by the explosion of asset/liability management strategies grew into a source of system-wide financial instability, as financial actors increasingly relied on short-term wholesale funding markets to enlarge their balance sheet and finance long-term asset positions, for instance in mortgage-backed securities. While the growth of these (shadow) banking practices and their complex relationship to the global financial crisis has been extensively discussed elsewhere, in this section I focus
more narrowly on the concrete relationship between repo markets and Fed policy. Since the 1980s, repo markets have expanded to an extent that today’s money markets can be characterised as a ‘repo-based financial system’ (Sissoko, 2019). As I show, the Fed relied on repo markets in the 1990s to preserve the coherence of its new monetary policy regime and effectively keep the funding needs of the shadow banking system off its own balance sheet—thereby outsourcing financial stability functions to the private sector and purportedly limiting its own exposure to this nascent sector. In turn, outsourcing strategic functions allowed the Fed to obscure its growing role in de-risking and accommodating finance.

The relationship between repo and monetary policy is typically linked to questions about the efficacy of the monetary policy transmission mechanism. Here, repos play a crucial role in central bank open market operations. The Fed interacts with a limited set of counterparties—primary dealers—through repo transactions collateralised with sovereign collateral and relies on the tight integration of repo funding markets to translate changes in interest rates to other types of repo transactions, interbank borrowing, and ultimately the wider economy. More broadly speaking, Gabor (2016) theorises the relevance of repo markets for public policy through what she calls the ‘repo trinity’. This trinity combines fiscal interests in maintaining demand for sovereign bonds through their use as collateral in repo transactions, with central bank interest in monetary policy transmission, and industry interests in increasing stability at the core of the market-based funding system. The growth of the repo markets thus reflects a point of convergence between private market and public policy interests, a shared interest for stability that manifested itself in the effort to safeguard, rather than curtail or constrain, these markets.

The heterogeneous interests of the repo trinity were forged together through a series of interventions and policy changes that bolstered the legal rights of repo lenders from the 1980s onwards. After repo market instability in the early 1980s, the legal treatment of collateral during bankruptcy proceedings emerged as a critical issue (Roe, 2010; Sissoko, 2019; Wansleben, 2020). Following the collapse of Lombard Wall Inc. in 1982, a bankruptcy court initially decided that repo transactions should be treated as secured loans, rather than outright transactions, meaning that lenders could no longer promptly liquidate the securities of a defaulting borrower. The decision put the liquidity of the repo market itself into question and prompted a fierce backlash by the
New York Fed and major banks and dealers. Following a concerted lobbying effort, in 1984 Congress amended the debtor-friendly Chapter 11 Bankruptcy Code to exempt repo participants from the usual bankruptcy proceedings and give repo lenders of government and agency securities ‘superpriority’ (Roe, 2010). Subsequently, similar rules were inserted into the FDIC Act in 1989 and expanded to non-bank financial institutions through amendments in 1991 (Gabor, 2016; Wansleben, 2020).

By the end of the 1990s, repo market instability emerged on policymakers’ radar, though regulators failed to act decisively in response. A key event was the Russian sovereign debt crisis and subsequent collapse of the hedge fund Long Term Capital Management (LTCM) in 1998. LTCM was a heavily leveraged hedge fund with counterparty links to major international investment banks. It was aggressively involved in a strategy of fixed income arbitrage, betting on the assumption that small differences between speculative and investment grade securities would ultimately converge. Following Russia’s default on its domestic debt, investors’ flight into safety caused the bond values that LTCM was betting on to diverge in unprecedented fashion. With LTCM’s anticipated profits turned into major losses, LTCM was unable to meet margin calls demanded by its lenders (CGFS, 1999; Dunbar, 2000). The crisis showed how excessive leverage could exacerbate systemic links between repo and collateral markets, as collateral price volatility—sharpened by the Russian crisis—affected repo contracts, causing margin calls and evaporating market liquidity (Gabor, 2016).

In subsequent discussions at the BIS, policymakers attributed the collapse of LTCM primarily to the failure of risk management tools to properly account for market liquidity dynamics: if collateral risk management was to be improved, stability would ensue (CGFS, 1999). For example, Value-at-Risk, a prominent private market risk management tool, had proven incapable of predicting the LTCM debacle because it had assigned sovereign default a likelihood of zero (Lockwood, 2015). Acknowledging some potentially destabilising effects of repo markets, international regulators emphasised the need to rely on core markets whose liquidity was considered immune to heightened volatility. Both the BIS and the IMF identified government bond markets as the most appropriate collateral due to their role as benchmark for pricing other assets. As such, they could provide the basis for the proliferation of private risk management techniques (Gabor, 2016). Yet by placing the emphasis on the shoulders of individual institutional risk management, the door was opened for the

4.4.1. Fed policy and the tri-party repo market

While the concept of the repo trinity provides a comprehensive picture of how varying interests aligned in support of repo markets, it is particularly relevant for understanding the bilateral repo market segment in which parties lend to each other directly. In parallel, US markets also developed a tri-party repo segment where management of collateral is outsourced to a clearing house. As I will show, the tri-party repo market took on a significant role in protecting Fed policy operations from negative spillovers from the nascent shadow banking sectors.

To appreciate the relationship between the growth of the tri-party repo market and Fed policy, it is important first to revisit the crucial role of the central bank in the final settlement of payment balances. Modern payments systems are inherently hierarchical: firms and households rely on bank deposits as a means of payment, and banks settle such transactions through the transfer of central bank reserves (Mehrling, 2011). In their everyday operations, banks conduct many payments and, to economise on reserves, they typically net the settlement of payments via a private clearing house such as the Clearing House Interbank Payment System (CHIPS). Following the failure of Bankhaus Herstatt in 1974, central bankers realised that the netting of payments itself can become a source of systemic risk by exposing banking institutions in various jurisdictions to missed payments (Özgöde, 2015, p. 391). Given the temporal gap between settlement and payment in a net system, the failure of a single well-connected bank could exert broader cascading effects on many other banks as chains of settlements were temporally interdependent on each other. The situation could theoretically be remedied by moving from net settlement to real-time gross settlement (RTGS) systems, although RTGS systems such as the Fed’s own FedWire came with their own challenges. Most significantly, the use of RTGS forced banks to pre-fund every trade, imposing significant liquidity costs compared to netted settlement. As a result, banks continued to rely on netted alternative payment infrastructures such as CHIPS whenever possible (Kaminska, 2019).
Throughout the 1970s and 1980s, the operation of this dual payments infrastructure created important complications for the Fed’s monetary policy and financial stability policy. Monetary policy issues arose as banks typically lacked the liquidity to pre-fund payments in FedWire and relied instead on consistent daylight overdrafts with the Fed. Unlike overnight discount window loans, which were penalised by the Fed, daylight overdrafts were not stigmatised and carried no interest cost, making it a highly effective form of short-term bank funding. Indeed, by the mid-1980s, these overdrafts routinely exceeded $60 billion, making it the true means of payment rather than bank reserves. Following the Fed’s shift to non-borrowed reserves targeting in 1979, the massive build-up in daily overdrafts thus ‘made a mockery of the Fed’s commitment to take back control of its balance sheet’ (Gabor, 2019). For a central bank concerned about manipulating credit conditions through small changes in bank reserves positions, large daylight overdrafts were thus threatening the credibility of its policy lever.

The second problem was that the rapid growth in overdrafts entangled the Fed within a highly complex and unstable financial payment structure, thereby exposing it to the risk that its counterparties would default on their outstanding, uncollateralised overdrafts. For instance, a settlement failure in CHIPS could induce widespread bank problems and force the Fed to absorb losses or intervene on behalf of a bank’s Eurodollar operations to shield FedWire from the fallout (Özgöde, 2021). The problem was exacerbated by the high exposure of banks to securities dealers who were funding their positions in the overnight repo market and relying on clearing banks’ access to Fed overdrafts to effectively finance their operations during the day. By 1988, four clearing banks accounted for about 70 percent of daily overdrafts, driven by intraday repo market securities financing (Gabor, 2019). Through granting banks access to free daylight overdrafts, the Fed was thus effectively providing an implicit backstop for both Eurodollar and shadow banking operations through its own balance sheet. Keen to avoid such exposure and reassert the credibility of its monetary policy regime, the Fed moved to restrict the use of overdrafts through various measures before implementing a fee on daily overdrafts in 1994 (Sissoko, 2020).

The effect of the new policy was to shift intraday credit provisions away from the Fed and towards the tri-party repo market as an alternative clearing house structure for the settlement of securities associated with repo transactions. The triparty repo market had
been developed in the late 1970s by Salomon Brothers to overcome time lags in the settlement of securities (Martin & McLaughlin, 2015b). As a market maker, Salomon both pledged and received Treasury securities throughout the day. Oftentimes, these two transactions would not align, and Salomon would incur additional financing costs whenever it received repo collateral too late in the day to clear the transaction through FedWire and then refinance it through new bilateral repos. Salomon’s solution was to circumvent FedWire altogether by using its clearing bank as an intermediary who would coordinate the exchange of cash and collateral. In netting out transactions, this clearing bank would require minimal movement in its own central bank reserves, and thus help shield repo transactions from FedWire. During the 1980s, triparty repo expanded rapidly as it offered a highly convenient and cost-effective way for securities dealers to refinance their government securities portfolio. By 1994, the tri-party repo market thus was ideally suited to absorb the securities settlements needs previously provided through daylight overdrafts (Gabor, 2019; Martin & McLaughlin, 2015a).

For the Fed, the advantage of the tri-party repo settlement of securities transactions was to keep repo market exposures off its balance sheet: by relying on clearing banks rather than FedWire, securities transactions no longer directly affected reserve positions and thereby did not interfere with the implementation of monetary policy. The repo market could now be separated into two distinct spheres of activity, organised around the trading strategies of dealers, including dealer-banks: on the one hand, dealers could finance their portfolio of sovereign debt securities relatively cheaply in the tri-party repo market by borrowing cash against collateral from large investors such as money market funds that were too large to keep their cash in traditional bank deposits; and on the other hand, dealers could lend cash at higher rates in the bilateral repo market against securities, providing capital to a range of highly leveraged bond portfolios in search of yield in riskier investments (Pozsar, 2015).

As the tri-party repo market took on an important role in the financing of securities for dealers themselves, the clearing banks overseeing this market took on an increasingly important market role (Sissoko, 2020). Initially, clearing banks took little initiative in the market, as their primary business was funding and clearing, rather than trading securities. As such, they merely served as market infrastructures for other dealers and had little influence on repo pricing, which was decided through the market making activities of securities dealers themselves. By the end of the 1990s, however, the shift
to universal, market-based banking (Hardie et al., 2013) increasingly blurred the boundaries between these activities. The merger of JP Morgan and Chase in 2000 marked an important development in the tri-party repo market, as it combined the former’s repo trading with the latter’s tri-party repo clearing under one roof, leading to a situation in which one of the two substantial tri-party repo clearing banks was suddenly also a substantial provider of liquidity through the repo market. Both due to its infrastructural role and its sheer size, JP Morgan Chase thus exerted a significant role both in pricing assets and setting terms in tri-party repo trading. With the problem of repo-related securities settlement moved off the Fed’s balance sheet, JP Morgan thus came to assume a key role as a market backstop of (second to) last resort, effectively moving or backstopping the market through its own interventions (Sissoko, 2020).

Yet the outsized role of JP Morgan and other large dealer banks in the repo market was not accompanied by additional regulatory safeguards that would have secured their continued role as market makers during a crisis. In fact, safeguards were removed: as already noted, in 2005 Congress expanded safe haven status to repo transactions collateralised by securities other than sovereign debt, such as mortgage-backed securities. While maintaining the integrity of the Fed’s monetary policy apparatus, the tri-party repo arrangements thus did little to stem the build-up of systemic instability within the growing shadow banking complex.

4.5. Conclusion: the global financial crisis and the efficacy of central banking

In providing an abridged history of the Fed’s money market strategy until the global financial crisis, this chapter has introduced several important analytical features of the macrofinancial approach which help illuminate the discussion in the following chapters. In particular, the chapter has shown that the evolution of Fed policy and money market changes are closely related. Since the late 1950s, the growth of liability management practices created problems for the efficacy of the Fed’s money market

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5 The other tri-party clearing bank was Bank of New York Mellon (BNYM). Following regulatory changes after the global financial crisis, JP Morgan exited tri-party repo clearing in 2018, leaving BNYM as the only clearing bank in the market.
operations that became obvious by the time of the 1966 credit crunch, leading to efforts to enlist these practices within a stable governance framework. Over the following decades, the Fed sought to reconcile the conflicting imperatives of monetary policy and financial stability policy through a process of experimentation, adjustment, and adaptation. By the 1990s, the Fed had established a relatively stable framework widely accepted as the ‘optimal’ policy arrangement. On an operative level this period of the Great Moderation depended on a functional relationship with the repo markets onto which the Fed came to outsource important monetary policy and financial stability functions.

As Grad et al. (2011) show, the unfolding of the global financial crisis can be interpreted as the consequence of the Fed’s reliance on private market mechanisms and the progressive failure of private market safeguards. At the first stage of the crisis, between late 2007 and the failure of Bear Stearns in March 2008, failures in mortgage-backed securities and the associated asset-backed commercial paper market prompted private market actors to crowd into secured lending markets, such as the FX swap markets—in the case of foreign, notably European, banks—and the repo market, placing heightened stress on these and related funding markets. During this period, the Fed sought to assuage markets by shifting towards an accommodative policy stance while continuing to rely on private market mechanisms to provide a backstop to trading conditions. Following the failure of Bear Stearns and heightened concerns about counterparty exposure, private repo dealers stopped absorbing the refinancing needs of the shadow banking sector, prompting the Fed to intervene more directly. During the second stage of the crisis, the Fed thus became more active as a lender in the market, relying on its tested emergency lending apparatus and specialised liquidity facilities to absorb funding stresses onto its own balance sheet.

The third and final stage of the crisis occurred after the collapse of Lehman Brothers in September 2008, notably after JP Morgan declared that Lehman’s assets were no longer adequate collateral in the tri-party repo market (Sissoko, 2020). Following the Fed’s decision to let Lehman go bankrupt, interbank and repo lending ground to a halt, forcing the Fed to intervene by expanding its balance sheet dramatically, effectively absorbing the market’s exit from its long mortgage-backed securities position. Here, the Fed came to act as a dealer of last resort (Mehrling, 2011).
With the crisis, the conflicting imperatives of monetary policy and financial stability policy—suppressed below the surface during the period of the Great Moderation—had thus resurfaced with a vengeance. In rapidly expanding the Fed’s balance sheet, the crisis interventions disrupted the operational framework of monetary policy as established during the era of inflation targeting. The Fed’s interventions were, in essence, a reflection of the stability needs of the rapidly expanding shadow banking practices: short of curtailing shadow banking itself, a large central bank balance sheet would become a necessary part of the central bank’s toolkit. Yet a significantly enlarged money market footprint poses important questions about the technical conduct of central banking: in disrupting the established channels of monetary policy, realigning the technical conduct of Fed policy with the post-crisis macrofinancial environment would require a process of readjustment and experimentation similar to the dramatic shifts in central banking practice witnessed during the Volcker shock. In effect, the Fed would have to reinvent its policy toolkit in order to maintain a level of influence over rapidly changing market dynamics. It is towards this challenge of redesigning policy, and the associated conflicts and confrontations, that this thesis now turns.
Chapter 5 – Unconventional monetary policy and the search for an exit strategy, 2008-2015

The previous chapter has shown that the Fed’s effort to govern ‘at a distance’—that is, to maintain a small footprint in money markets by outsourcing monetary policy and financial stability functions to private markets—had collapsed with the global financial crisis. Prompted by subsequent interventions, the Fed’s balance sheet expanded dramatically. At the beginning of 2007, the Fed’s assets totalled $880 billion. By the end of 2008, following emergency interventions and some asset purchases, total assets stood at $2.2 trillion. By the end of 2009, total assets were still $2.2 trillion, though the composition of assets had changed: in place of emergency lending and special crisis facilities, the Fed had purchased large quantities of mortgage-backed securities and Treasury securities. These large-scale asset purchases—commonly known as Quantitative Easing—would continue for some time. By October 2014, after three rounds of QE, the Fed’s assets had quadrupled to $4.5 trillion.

While Quantitative Easing was initially considered a temporary remedy by many—an idea exemplified by the label ‘unconventional’ monetary policy—it increasingly came to dominate post-crisis macroeconomic management. Nor was it a purely American phenomenon. Soon, other central banks followed the example of the Federal Reserve in reducing interest rates and adopting asset purchase programmes. Despite the widespread adoption, the turn towards QE has been far from uncontroversial. On the political right, QE has been met with fears about excessive money creation and dire warnings of inflation and government control over markets (Paul, 2009). On the liberal left, QE has been blamed for increasing wealth inequality as well as financial instability by fuelling the appreciation of asset values that result from low funding costs and high demand (Krugman, 2014; Stiglitz, 2015).
Given the politicisation of unconventional monetary policy, it is no surprise that central bankers have been keen to ‘normalise’ their monetary policy practices—an idea that was broadly associated with the tightening of monetary policy, a reduction of the central bank balance sheet, and a return to the pre-crisis practice of targeting short-term interest rates. Yet with markets accustomed to easy monetary conditions, efforts to unwind QE have proven difficult. In 2013, the Fed’s announcement that it would start to taper its balance sheet produced jitters in global markets, prompting a course correction. In 2017, the Fed cautiously began to reduce its asset holdings only to abruptly change course again once short-term repo rates spiked significantly and unexpectedly in September 2019. Shortly thereafter, discussions about balance sheet reduction were rendered mute by the onset of the Covid-19 pandemic. The pandemic response witnessed the most rapid expansion of the Fed’s balance sheet in history: within a matter of months, the Fed’s assets expanded from $4.1 trillion in February to $7.1 trillion in June 2020 and continued to grow thereafter.

This chapter and the next analyse why the Federal Reserve encountered such difficulties in unwinding QE and ‘normalising’ monetary policy in the post-crisis period. I argue that the exit from unconventional policies proved difficult because the Fed thought of ‘policy normalisation’ as the adjustment of monetary policy alone: in effect, normalisation was conceived of as a form of ‘quantitative tightening’ to undo the accommodative effects of QE. Based on this assessment, Fed officials prominently linked their exit strategy to macroeconomic (i.e. non-financial) indicators such as inflation and employment figures. What was lacking, however, was a fundamental understanding of the changes in the financial structure of the economy that would complicate a return to pre-crisis practices of monetary policy. Post-crisis changes had created a new macrofinancial environment in which the governance of liquidity was increasingly entangled across different policy domains: the Fed’s large balance sheet had implications not just for the operative conduct of monetary policy, but also shaped fiscal and macroprudential financial stability policy in new and unexpected ways. In this new world of ‘unconventional monetary governance’, any exit strategy would require the close coordination and alignment of policy domains in affecting liquidity conditions and the operation of private market actors.

In employing a critical macrofinancial analysis, this thesis thus adds an additional layer of commentary to conventional interpretations of QE, which focus
predominantly on the asset side of the Fed’s balance sheet. By contrast, the macrofinancial perspective highlights the importance of changes on the liability side of the balance sheet: I show how the ample reserves environment created by QE forced Fed officials to problematise the efficacy of monetary policy operations within a drastically altered money market environment. In focusing on such operative questions, I analyse not just how much the Fed’s money market strategy has changed in relation to pre-crisis practices (as discussed in Chapter 4), but also highlight how the post-crisis environment structurally changed how financial actors operate within the money markets and relate towards the Federal Reserve. As such, the analysis presented in this chapter offers important insights into the difficulties that the Fed would encounter in its attempts to ‘exit’ from QE and ‘normalise’ its monetary policy conduct (as I will discuss in detail in Chapter 6).

The chapter is organised into three sections. The first section introduces the macroeconomic rationale for Quantitative Easing, documents its implementation and political contestation, and discusses the Fed’s motivations for formulating an exit strategy from unconventional policy. Section two and three discuss the market mechanisms that would shape the Fed’s normalisation strategy. While section two discusses the policy levers the Fed introduced to regain control over its short-term interest rate target, the macrofinancial analysis in section three highlights the difficulties that macroprudential regulatory changes pose for the Fed’s exit from unconventional monetary policy.

5.1. The turn to unconventional monetary policy

A close look at the expansion of the Fed’s balance sheet offers a concise window into the global financial crisis and its aftermath. During the initial phase of the crisis, the Fed’s balance sheet remained relatively constant: the Fed’s first response to financial distress in the summer of 2007 was simply to ease monetary policy by lowering the Fed funds target in stages from 5.25 percent in July 2007 to 2 percent in May 2008. At the same time, the Fed acted as a classic lender of last resort by providing good collateral against questionable collateral. To that end, the Fed would sell off or swap its holdings of Treasury bills and lend the proceeds to the financial system through its
newly created liquidity programmes such as the Term Securities Lending Facility (TSLF) and the Term Auction Facility. The TSLF offered primary dealers the option to borrow Treasuries from the Fed against less liquid securities such as agency debt and mortgage-backed securities. While these activities changed the composition of the Fed’s asset holdings, it left its liability position largely unchanged. In effect, the Fed was reallocating rather than adding liquidity to the financial system (Grad et al., 2011).

*Figure 5.1. Federal Reserve Assets, 2008-2014 ($ billion)*

As Figure 5.1. shows, the Fed’s asset holdings only expanded following the events of September 2008. Before the global financial crisis, the Federal Reserve’s assets were composed primarily of US Treasury securities. Following the collapse of Lehman Brothers and the rescue of AIG, the Fed drastically scaled up its emergency lending programmes. This time, the Fed could no longer sterilise its lending by selling or repoing out more Treasury securities, and instead expanded its balance sheet on both sides (Ivanova, 2019). The Fed was effectively borrowing from banks by adding new reserves on the liability side to lend to a variety of money market participants through loans that showed up on the asset side of its balance sheet. Testifying to the international dimension of the crisis, a major share of emergency liquidity was absorbed by the US branches and subsidiaries of foreign banks, both through the Fed’s
discount window and via central bank swap lines (Fleming, 2012; Hardie & Thompson, 2020).

As the crisis liquidity facilities were wound down in late 2008 and early 2009, the Fed began to invest the proceeds in mortgage-backed securities. The Fed effectively allowed the private market to shed its long MBS position by absorbing a one-sided order flow onto its own balance sheet. By posting a bid price above market levels, the Fed ensured confidence in the market value of mortgage-backed securities and thus encouraged GSEs such as Fannie Mae and Freddie Mac to keep underwriting new securitised products (Grad et al., 2011, p. 17). The Fed’s early asset purchases targeted risk and liquidity premiums of specific private assets, in effect allocating liquidity to specific market segments that were deemed credit constrained. In targeting credit spreads and aiding the private sector’s deleveraging, these first large-scale asset purchases thus had a clear financial stability motive (Ivanova, 2019). Yet unlike emergency lending, asset purchases were not targeted at specific institutions: the goal was to push down risk premiums more broadly.

The financial stability aspect was quickly supplanted by macroeconomic concerns. By December 2008, the effective Fed funds rate had reached zero. The growth in the Fed’s balance sheet significantly expanded excess reserves in the banking system, eliminating the need for interbank trading. At the same time, the solvency of individual banking institutions remained in question and private sector lending was characterised by high risk aversion. As a result of these changes, the monetary policy transmission process itself was impaired. As the Fed soon discovered, even at the zero lower bound of interest rates it was still unable to stimulate the economy sufficiently. This situation has come to be known as a ‘liquidity trap’ (Krugman, 2000), although this terminology differs somewhat from Keynes’ original meaning.6 Faced with the prospect of deflation, conventional monetary policy had run its course. In addition to addressing the liquidity problem in financial markets and restoring functionality, the Fed’s expanded asset purchases now turned towards stimulating aggregate demand (Eichengreen, 2015, p. 304).

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6 The Keynesian liquidity trap arises when reductions in the central bank’s target rate cannot bring down long-term interest rates, a situation which could happen at a non-zero short-term interest rate (Skidelsky, 2018).
The Federal Reserve’s turn to Quantitative Easing as a macroeconomic tool was a stopgap measure amidst a flagging fiscal response. In early 2009, the need for fiscal stimulus was widely recognised by the incoming Obama administration (Tooze, 2018). Yet confronted with the breakdown of bipartisan politics in Washington and conflicted over the growing deficit, its stimulus package remained limited in scale and ambition. While providing a much-needed boost to the American economy, it proved insufficient to lift the economy out of recession. By end-2010, the window for further stimulus disappeared as the Republican Party took the House of Representatives in the mid-term elections. With fiscal stimulus lacking, the onus of the post-crisis response fell to monetary easing.

Unconventional monetary policies were essentially untested: as I outline in more detail below, fears of policy overreach, a loss of Fed independence, and the creation of inflationary pressures haunted not just internal discussions at the Fed but also characterised outside perceptions of the new policies. What helped give shape to the Fed’s approach was the theoretical groundwork that Bernanke himself had laid in his academic career. Already during the early 2000s, Bernanke had contributed to a series of studies on how to deal with deflation caused by low aggregate demand. His key insight was that a central bank should always be able to generate increased nominal spending by manipulating long-term yields, even when short-term interest rates are at zero (e.g., Bernanke, 2012a). According to Bernanke, central banks have several options to pursue such a strategy: first, central banks can suppress the yields on government bonds by shaping expectations around the future of short-term interest rates. In this so-called ‘forward guidance’, central bank communication would seek to assure markets that interest rates will stay lower for longer (Bernanke & Reinhart, 2004). Alternatively, central banks can change the composition of their assets towards long-term bonds to influence the term-premium of long-term yields. If this proves insufficient, central banks can engage in outright asset purchases beyond what is needed to manipulate short-term interest rates (Bernanke et al., 2004).

In Bernanke’s thinking, unconventional monetary policies focus on the asset side of the central bank’s balance sheet. Unlike ‘conventional’ open market operations, which seek to manipulate short-term interest rates by shaping banks’ reserve positions and leave the determination of long-term interest rates to market expectations, QE relied on the asset side of the Fed’s balance sheet to influence long-term interest rates
directly. The theory behind this approach has become known as the portfolio-rebalancing channel, whereby ‘purchases of financial assets financed by central bank money increase liquidity and push up asset prices, as those who have sold assets to the central bank rebalance their portfolios into riskier assets’ (Joyce et al., 2014, p. 3). In effect, the portfolio rebalancing mechanism works by encouraging investors to shift investments away from safe assets purchased by the central bank and towards riskier assets with higher expected returns. Higher private sector demand for riskier bonds in turn increases their price and lowers yields.

What made QE so controversial were the political implications of the portfolio-rebalancing channel. By manipulating long-term yields directly, the central bank engaged in something akin to a form of ‘central bank planning’, whereby long-term asset prices and yields that were ‘[o]nce a barometer of the decentralized beliefs and actions of myriad market actors’ suddenly became ‘a policy variable, manipulated by central banks to reduce the “perceived downside risk” for investors’ (Braun, 2018, p. 212). The advantage of this approach was to expand the reach of monetary policy beyond its usual confines: by manipulating asset prices more broadly, the central bank could affect prices that were typically not driven by monetary inputs. Yet for its critics, QE threatened not only to undo the Fed’s decades-long struggle to anchor expectations firmly within markets but put the central bank’s very independence from fiscal politics into question (Blommestein & Turner, 2011; Tucker, 2018). For this reason, many critics—both inside and outside of the Fed—accepted QE as a necessary remedy only until recovery occurred, at which point conventional monetary policy and prudential tools could resume their role in ensuring price and financial stability jointly. As I discuss below, almost from its inception, QE has thus been accompanied by calls for an exit strategy.

5.1.1. The implementation of Quantitative Easing

The beginning of QE1 dates to the 25th of November 2008, when the Fed announced its intention to purchase $100 billion of federal agency debt and $500 billion of private mortgage-backed securities guaranteed by the GSEs. In March 2009, the Fed expanded its asset purchase programme by announcing additional purchases of $750 billion in MBS and $100 billion of federal agency debt. At the same time, the Fed
added its first purchases of longer-term Treasuries securities, announcing purchases worth $300 billion. Yet by tracing the pace of Fed purchases, investors could see that Treasury purchases would end in the second half of 2009, and agency debt and mortgage purchases in early 2010. The long-term effect of asset purchases on inflation rates was thus far from certain. In part, the hesitancy to provide an open-ended purchase commitment reflected the initial idea that QE1 was primarily a mechanism to restore the functioning of specific credit markets, rather than a sustained macroeconomic intervention (Eichengreen, 2015, p. 305).

The limited nature of QE1 owed much to political perceptions of the Fed’s actions. As internal FOMC documents show, several Reserve Bank Presidents, notably Lacker (Richmond), Bullard (St. Louis) and Fisher (Dallas), were highly sceptical about the precise effects and purposes of Quantitative Easing. Despite recognising the need for stimulating demand, they consistently expressed concerns that the Fed’s balance sheet expansion was aiding the build-up of inflationary pressures. As they argued, the Fed’s purchases of Treasury securities were giving markets the impression that the Fed was monetising sovereign debt, thereby sending a dangerous signal that the Fed was no longer primarily concerned with ensuring price stability. This in turn would fuel inflation expectations across markets, and thus turn into a self-fulfilling prophecy (e.g. FOMC, 2009b, p. 129; 2009c, p. 88). Their concerns were echoed in Senate Hearings in the House Committee on Financial Services and Senate Committee on Banking, Housing and Urban Affairs. Giving voice to the widespread belief that QE was likely to be inflationary, Representative Ron Paul accused Bernanke in July 2009, ‘you have doubled the money supply…so it seems to me that you are in the midst of [creating] massive inflation’ (H. Hrg. 111-64, 2009, p. 19), while other Representatives repeatedly questioned Bernanke on debt monetisation, money printing, and the Fed’s relationship to the Treasury (cf. Ronkainen & Sorsa, 2018).

In response, Bernanke always emphasised the Fed’s ability to unwind QE and tighten monetary policy if inflationary pressures required so. Already in July 2009, Bernanke laid out the key mechanisms for monetary tightening in an op-ed in the Wall Street Journal, emphasising that ‘we are confident we have the necessary tools to withdraw policy accommodation, when that becomes appropriate, in a smooth and timely

7 The Humphrey-Hawkins Full Employment Act of 1978 requires the Fed to debate the conduct of monetary policy twice a year in these two committees.
manner’ (Bernanke, 2009a). Internally, the FOMC started to debate its normalisation or exit strategy in earnest in late 2009 and early 2010 (FOMC, 2009a, 2010a). At the time, the internal debate was still characterised by the perception that QE could be unwound along with emergency lending facilities once the crisis was in the rear mirror. As Bernanke affirmed in the December 2009 FOMC meeting, normalisation was about signalling ‘that we are exiting from extraordinary [liquidity] facilities where we can, and that we hope that it will inspire confidence that we are moving towards more normal [monetary] policy’ (FOMC, 2009a, p. 137).

Yet while the need for an exit strategy was broadly accepted amongst FOMC participants, the precise timing of a tightening move remained far from clear. Already by mid-2010, concerns about the worsening Euro crisis and a lagging fiscal response domestically intensified fears of a double-dip recession (Tooze, 2018). Given the pressures on the economy, the FOMC pivoted towards implementing a new round of QE on the 3rd of November 2010. QE2 involved the purchase of $600 billion of longer-term Treasury securities over a period of eight months at a pace of about $75 billion per month. Announced one day after Republicans gained the House of Representatives in the midterm congressional elections, the arrival of QE2 was immediately political. No longer seen as an immediate crisis response, to its critics the new purchase programme appeared as an unjustified extension of a dangerous trend of central bank overreach that would only stoke the flames of inflation. Echoing these concerns at the November FOMC meeting, Governor Fisher argued that the timing of QE2—right after the 2010 mid-term elections—risked placing the Fed’s credibility and independence in question: ‘I expect the propensity to draw that conclusion [of overreach] has been enhanced by this congressional election. Indeed, I believe… we would be waving a red flag in the face of those who are our most volatile critics’ (FOMC, 2010b, p. 152).

Given the political risks, the Fed opted for what Bernanke privately characterised as a ‘very conservative, middle-road approach’. Instead of choosing a drastic ‘shock and awe’ tactic, Bernanke characterised QE2 as a measured form of ‘insurance against those bad downside risks’ of deflation, a faltering recovery and higher unemployment (FOMC, 2010b, p. 198). As Bernanke himself conceded at the meeting, a more effective programme would have required ‘to raise inflation expectations above your normal level’ (FOMC, 2010b, p. 107). In public, at Jackson Hole, he had already
rejected such a step: to avoid being seen as publicly stoking the flames, Fed policy would only ever seek to match the inflation target, not supersede it (Bernanke, 2010a). Despite walking a political tightrope, the announcement of QE2 faced an immediate backlash. While markets responded as intended by moderately moving up inflation expectations, an open letter in the *Wall Street Journal*, signed by a number of high-profile economists, investors and political strategists with links to Congressional Republicans, warned that ‘[t]he planned asset purchases risk currency debasement and inflation, and we do not think they will achieve the Fed's objective of promoting employment’ (WSJ, 2010). The letter itself was written in opposition to Bernanke’s pre-emptive reassurance, published several days before in the *Washington Post*, that thus far QE had ‘had little effect on the amount of currency in circulation or on other broad measures of the money supply, such as bank deposits’ (Bernanke, 2010b).

Internationally, QE2 created tensions not because of its supposed effect on inflation but rather because of its role in influencing exchange rates: by keeping interest rates low, Quantitative Easing created expectations of dollar depreciation. Cheap dollar funding allowed international investors to bet on currency appreciation in emerging markets and hurt export industries. Already before the introduction of QE2, Brazil’s finance minister had characterised the international monetary spillovers caused by the Fed’s asset purchases as a form of ‘currency war’. In November 2010, after the announcement of QE2, international diplomats expressed their dismay at the Fed’s action at the G20 meeting in Seoul. Echoing the Brazilian sentiment, China’s Vice Finance Minister Zhu Guangyao described the Fed’s decision to buy $600 billion in Treasury securities as a ‘shock’ to emerging markets that showed a glaring lack of awareness of the international reach and consequences of the Fed’s actions (cf. E. Prasad, 2014, pp. 126-127). Germany’s Finance Minister Wolfgang Schäuble, meanwhile, referred to the Fed’s actions as ‘clueless’, arguing that they would undermine US policy credibility and increase global economic uncertainty (cf. Atkins, 2010).

In terms of its long-term impact, QE2 once again proved to be on the cautious side. As with QE1, the lack of an open-ended commitment to asset purchases meant that investors knew when the effect of QE2 would wear off. Inflation expectations, after rising to 3 percent in early 2011, fell back to barely 1 percent at the end of the Fed’s purchases in the summer of 2011 (Eichengreen, 2015, p. 308). At the same time, fiscal
stimulus was increasingly unlikely. Since 2009, Congressional Republicans had been waging a relentless political war against the Obama administration’s fiscal spending commitments. Republican opposition culminated in the debt ceiling drama in 2011 and again in 2013, when lawmakers brought the federal government to the brink of technical default. With Republicans targeting both fiscal and monetary expansionism, it was impossible for the Fed to commit to QE3 in the summer of 2011. Instead, the Fed announced plans to extend the average maturity of its securities holdings by purchasing ten-year Treasury bonds while selling off shorter-dated Treasury securities. The idea behind this Maturity Extension Program was to reduce ten-year Treasury and mortgage rates without any further expansion of the Fed’s balance sheet. Dubbed ‘Operation Twist’ in recognition of its historical precedent—a set of operations undertaken in 1961 to push down long-term yields—the Fed’s intervention substituted $667 billion of short-term for long-term Treasury securities from September 2011 through 2012 (FRBNY, 2021).

Confronted with a sluggish recovery, in September 2012 the Fed decided to do more. QE3 was the biggest expansion yet, and unlike the previous rounds it was open-ended. The Fed initially committed to monthly purchases of $40 billion in agency MBS until it recognised substantial improvement in the outlook for the labour market (Federal Reserve, 2012). The Fed’s goal was to continue buying until the unemployment rate fell below 6.5 percent, and inflation remained less than 2.5 percent. With unemployment rates hovering at 7.7 percent, in January 2013 the Fed started additional monthly purchases of $45 billion in longer-term Treasury securities. In January 2014, these purchases were scaled back slightly by $5 billion per month, with the pace of purchases decreasing by another $5 billion after each FOMC meeting until October 2014, when QE3 came to an end. In total, the Fed purchased $823 billion in agency MBS and $790 billion in Treasuries under QE3, and afterwards maintained its balance sheet size by reinvesting the proceeds of maturing securities (FRBNY, 2021).

After three rounds of QE, the Fed was profoundly transformed as an institution. In expanding its balance sheet, the Fed increasingly underpinned not just the American banking system, but the entire global dollar system. In buying up long-term securities in exchange for short-term reserves, the Fed had effectively absorbed onto its books the maturity mismatch that had previously been carried by the shadow banking system, including European banks (Tooze, 2018). But the political role of the Fed had also
changed. Even though QE had failed to provoke sustained inflationary pressures, the Fed’s policies had drawn considerable criticisms from across the political spectrum. In response to these developments, lawmakers from both parties had at various points introduced bills in Congress relating to the Federal Reserve, including those that advocated giving Congress the power to order reviews of the Fed’s monetary power decisions, replace discretion with rules in interest rate policy, and impose limitations on the Fed’s emergency lending facilities (Bernanke, 2015, pp. 571-573). While these bills have been unsuccessful, the overt politicisation of Fed policy certainly contributed to the desire on the part of Fed officials to exit QE and ‘normalise’ monetary policy—an idea that I turn to now.

5.1.2. The quest for policy normalisation

Since late 2008, asset purchases had morphed from a crisis response aimed at closing credit spreads into a broader macroeconomic tool to aid the recovery. Amidst flagging fiscal stimulus, QE became an expansive tool for stimulating demand as the Fed took on a broader role as macroeconomic manager. Yet as QE expanded in scope, so did criticisms of it. As I have already noted, the most vocal criticism came from those who regarded the Fed as potentially creating inflation. The academic consensus has long been that there are significant lags to the monetary policy transmission mechanism (Bernanke, 2004; M. Friedman, 1961). As a result, inflationary pressures could develop before they were observable within official statistics, a threat that was perceived as particularly high with interest rates at the zero lower bound. As Janet Yellen, Bernanke’s successor as Fed Chairman, stated repeatedly in 2015, a sudden reappearance of inflation would overwhelm the Fed precisely because the required response—a rapid rise in interest rates—would be deeply destabilising: ‘were the FOMC to delay the start of policy normalization for too long, we would likely end up having to tighten policy relatively abruptly to keep the economy from significantly overshooting both of our goals’ (Yellen, 2015, p. 10).

What drove such concerns was the fear that far from aiding the recovery, QE was becoming the new normal. As President Fisher of the Federal Reserve Bank of Dallas put it in a FOMC meeting in 2010:
Everything we know from monetary history tells us that, in times of crisis, we should open the flood gates. That is Bagehot 101. We did that. It worked to pull us from the maw of financial panic and economic ruin. But this is neither a time of panic nor is it a time of emergency. If we were to come to be perceived as applying QE as part of our normal policy toolkit, I’m willing to bet that the markets will expect more…it grows and it grows and it may be impossible to trim off once it takes root in the minds of market operators (FOMC, 2010b, pp. 152-153).

As the Bank for International Settlements also warned, the growing expectation of central banks to do more ‘would make the eventual exit from monetary accommodation harder and may ultimately threaten central banks’ credibility’ (BIS, 2012, p. 48). From this perspective, the prolonged low interest rate would not only eventually stoke inflationary pressures; by shaping market expectations about easy refinancing conditions it could also facilitate excessive risk-taking. Another key motivation for policy normalisation thus was to preserve the future ability to meet financial distress—interest rate hikes today would create the headroom to lower rates in a future recession (Yellen, 2014).

While Fed officials were aware of the potential downsides of prolonged accommodative policy, they were keen to highlight the benefits of QE in public. For instance, in his Jackson Hole speech in 2012, Bernanke (2012b) referred to studies that had shown the impact of QE1 and QE2 on Treasury bill rates, as well as their role in creating more than 2 million jobs and raising the level of economic output by nearly 3 percent. As long as economic conditions warranted it, the Fed was committed to sustaining its accommodative policy. To preserve policy space, the Fed sought at various times to specify clear triggers for unwinding QE programmes over time, notably inflation and unemployment figures (Ronkainen & Sorsa, 2018).

Tying its actions to such indicators brought its own problems, as the Fed was to learn in the summer of 2013. The Fed had tied QE3 to conditions in the American labour market, and by spring 2013, it began to drop hints about an eventual tightening of policy. Fed officials proceeded cautiously, as they did not want to ‘taper’ the balance sheet too abruptly amidst a still sluggish recovery. In a press conference in June 2013, Bernanke indicated that conditional on continued positive economic data on growth and employment figures, the FOMC would vote on scaling back its asset purchases at the upcoming September 2013 policy meeting (Tooze, 2018, p. 475). His comments triggered a minor market panic, which has become known as ‘taper tantrum’. The reaction was particularly strong in emerging markets. Confronted with tighter
borrowing conditions and a stronger dollar, global investors pulled their money. Large capital outflows from many emerging market economy bond markets drove up yields and led to a sharp depreciation of currencies. In its September meeting, the Fed decided not to act. Instead, it announced that it would continue its bond buying programme, until economic conditions had improved more sustainably (Miyajima & Shim, 2014).

One year later, in September 2014, the Fed set out clear and cautious steps for a future normalisation of monetary policy (Federal Reserve, 2014). The 2014 guidelines were an update of the preliminary commentary issued in 2010 and 2011, and it included an important change: previously, the two methods of normalisation—interest rate rises and balance sheet taper—were tightly interlinked. Yet in 2014, they were decoupled: the FOMC stated that rate hikes could go ahead before balance sheet taper was to be considered. Publicly, Fed officials have given the greater familiarity both of policymakers and market actors with interest rate tools as a reason for the more prominent role of rate increases. As President Fisher explained in the September 2014 FOMC meeting, raising the rate target ‘is essential if the economy is to be declared to be operating in a normal manner, so we can say the crisis is behind us’ (FOMC 2014: 44). An increase thus would send a strong signal that the Fed considered economic conditions to be normalising and was prepared to counteract both inflationary pressures and excessive risk-taking.

By contrast, FOMC participants expressed more ambiguity over the strategy for balance sheet taper. In theoretical terms, Fed officials saw little difference between the two mechanisms in affecting domestic output and inflation. In tightening financial conditions, both measures would have near-identical effects on aggregate domestic activity (Dudley, 2017). Whereas rate hikes tighten financial conditions through the familiar interest rate channel, the reversal of QE reduces the Fed’s asset portfolio and puts pressure on long-term bond yields. Yet while Fed officials saw little difference in how the mechanisms effected macroeconomic variables, questions remained about the effect of the balance sheet taper on financial market microstructure. As staff from the Fed’s money market working group were to emphasise in an internal presentation in 2016 (FOMC, 2016b, pp. 11-12), post-crisis changes had fundamentally reconfigured money market relationships:
Since the crisis, a global regulatory reform program has put into place important new regulations to limit imprudent risk-taking, intended to increase the safety and resiliency of the financial system. Looking narrowly at money markets, the regulations that should have the greatest effect include the expanded FDIC base… and the Basel III regulatory changes, which include the supplementary leverage ratio, the liquidity coverage ratio, and the net stable funding ratio […] Conversations with market participants suggest that the structural demand for reserves likely has increased significantly over the pre-crisis experience, and demand for reserves may also be more variable. The increased reserve demand stems from both precautionary and regulatory factors as well as changes in business practices.

The disentanglement of interest rate policy and balance sheet taper thus points to an important ambiguity within the Fed’s money market strategy: as the discussion of interest rate hikes showed, the Fed’s policy normalisation strategy was conceived primarily in macroeconomic terms and conceptually linked to economic indicators such as inflation and employment figures. Yet as the concerns about the process of balance sheet taper reveal, the ongoing implementation of macroprudential regulation would impose new and unexpected macrofinancial constraints on Fed policy.

In line with the argument advanced in this thesis, a full assessment of the Fed’s QE programmes and its attempt at ‘normalising’ policy thus requires a conceptual shift away from the conventional macroeconomic categories and towards a macrofinancial account of QE. It is only from a macrofinancial perspective that we can fully understand the difficulties the Fed would encounter in exiting from QE: as I outline below, far from simply unwinding unconventional policies in the same manner in which they had initially been implemented, governing through markets would require the Fed to adapt its policy apparatus and realign it with the new demands for liquidity that were shaping markets in the post-QE period. The exit from QE, in other words, was not a simple question of ‘normalising’ monetary policy: governing post-crisis markets would require significant coordination between monetary and macroprudential policy. Normalised monetary policy—that is, something more akin to the practices of short-term interest rate targeting that characterised the pre-crisis period of the ‘Great Moderation’—thus would need to coexist with some form of unconventional central banking more broadly conceived (Musthaq, 2021).

In effect, this would require a two-pronged policy. First, the Fed would need to acquire and adapt its operative procedures for the implementation of monetary policy in an excess reserve environment. To affect short-term interest rates before tapering the balance sheet significantly, the Fed needed new tools—an issue that Fed officials were
keenly aware of. Yet in a second step, the Fed would need to find ways of aligning its monetary policy procedures with the new regulatory framework that was reformatting financial intermediation—most significantly, the Basel III macroprudential reforms. What this alignment of money market strategies would look like was far from clear. As an internal April 2016 FOMC discussion about the relationship between monetary policy and macroprudential policy shows, FOMC participants continued to consider these two policy domains as essentially separate. As neatly summarised by the President of the Federal Reserve Bank of Cleveland, Loretta Mester (FOMC, 2016a, p. 31),

the FOMC cares about financial stability to the extent it affects the health of the real economy. Minor disruptions or volatility in financial markets that represent the ebb and flow of a dynamic economy but do not threaten the health of the economy are not something the FOMC should respond to.

As I argue below, fundamental changes in the institutional structure of liquidity would make such a sentiment increasingly untenable. In effect, Fed officials were experiencing an increasing disconnect between the desire to return to pre-crisis practices of monetary policy implementation (as discussed in chapter 4), and the post-crisis realities of a changed macrofinancial architecture. In line with the argument advanced in this thesis, the remainder of this chapter now applies a macrofinancial perspective to make sense of this challenge—that is, the challenge of designing the tools to aid the normalisation of interest rates and aligning their functioning with a changed market environment.

5.2. Short-term interest rate control in an excess reserve environment

The turn towards Quantitative Easing has shifted attention away from the liability side of the Fed’s balance sheet. Whereas QE was intended to manipulate bond prices and yields, the funding of such asset purchases through the expansion of bank reserves is generally treated as a mere by-product. For the Fed, however, the expansion of reserves undermined control over short-term interest rates, the conventional target of monetary policy. As can be seen in Figure 5.2., before the crisis the Fed’s liabilities were composed primarily of currency. Other liabilities including bank reserves were relatively scarce, allowing the Fed to manipulate the overall demand for reserves
through targeted open market operations. In the post-crisis period, bank reserves expanded dramatically. As this section details, to maintain control over financial processes within this drastically altered macrofinancial architecture, the Federal Reserve experimented with a variety of policy levers to maintain control over short-term interest rates in an ample reserves environment, including the introduction of administered policy rates and expansion of access to the Fed’s balance sheet for a variety of money market participants.

**Figure 5.2. Federal Reserve liabilities, 2008-2014 ($ billion)**

![Graph showing Federal Reserve liabilities, 2008-2014](image)

While the Fed devised its new policy tools with the objectives of *monetary policy* in mind, in a dramatically changed money market environment these new policy levers would immediately exert a strong effect on financial flows and interact with macroprudential regulatory changes in unexpected ways. As the success of any governmental strategy depends on the ability of policymakers to affect the financial institutions and processes that exist within markets, these interactions highlight the need for stronger coordination between the money market strategies of different public actors.
5.2.1. Interest on Excess Reserves

Before the crisis, the Fed implemented its monetary policy by targeting the interest rate at which banks lend in the Fed funds market. The Fed funds market is an unsecured interbank market in which US-chartered banks and certain other depository institutions settle their accounts by acquiring short-term funds from other banks for overnight deposits at the Federal Reserve (Cook & Laroche, 1993). Banks actively relied on the Fed funds market by using interbank borrowing to satisfy reserve requirements and payments needs, and interbank lending to avoid the holding of unremunerated excess reserves. The interest rate at which banks trade reserves within the Fed funds market is a market rate: it is not directly set by the Federal Reserve. To influence its operational target, the effective Fed funds rate, the Federal Reserve would conduct open market operations. By buying (selling) Treasury bills in the repo market, the Federal Reserve credits (debits) the reserve balances of individual banks, thereby expanding (contracting) the overall amount of reserve balances available for trading. Open market operations were a successful policy tool because banks tended to hold only minimal reserves to satisfy reserve requirements. For instance, in September 2007, the banking system’s required reserves stood at about $12 billion, with excess reserves of only $1.4 billion. The relative scarcity of excess reserves gave the Federal Reserve considerable power to influence the Fed funds rate by manipulating the overall supply of reserves. As banks operate across different money market segments, arbitrage trades ensured that changes in interest rates are transmitted across market segments, linking the Fed funds market to repo and Eurodollar markets (Ihrig et al., 2015).

As already discussed, the crisis changed the dynamics of monetary policy transmission. The growth of the Fed’s asset portfolio—first under the emergency lending programmes, and later through asset purchases—were matched by an increase in bank reserves on the liability side of the Fed’s balance sheet. As banks suddenly found themselves flush with reserves and no longer needed to borrow to meet their everyday settlement obligations, Fed funds trading collapsed. Before the crisis, the trading volume in the Fed funds market averaged more than $250 billion per day, with most trades occurring between wholesale and commercial banks. In early 2010, after the first round of QE, trading had fallen to $89 billion (Kreicher et al., 2013, p. 7). The collapse of the Fed funds market presented the Fed with two problems: first, in the
context of excess reserves, it became near impossible to control the Fed funds rate via changes in bank reserve balances; and second, the decline of market activity limited the power of the Fed funds market to act as a transmission mechanism for monetary policy more broadly.

To address the situation, the Fed was looking for new policy levers. One option was to control the cost of bank reserves directly through regular interest payments. While the Fed lacked the legal authority to pay interest on reserves, the Financial Services Regulatory Relief Act of 2006 had authorised the Fed to pay interest payments on reserve balances beginning in 2011. In light of the crisis, Bernanke petitioned Congress for immediate authority, which was granted through a provision in the TARP Act on October 1, 2008 (Ivanova, 2019, p. 267). Contrary to the effective Fed funds rate, which the Fed only controls indirectly, the new rate—Interest on Excess Reserves (IOER)—is an administered rate. As such, IOER was meant to operate independently of the size of the Fed’s balance sheet, effectively decoupling the Fed’s asset purchases from its broader interest rate policy (B. Friedman, 2015).

In providing an independent lever, IOER was seen as a critical component in the Fed’s normalisation toolkit. The new rate would allow immediate tightening even before balance sheet taper had sufficiently squeezed financial conditions to merit a rise in the effective Fed funds rate. In operational terms, the idea behind IOER was to place an interest rate floor under other money market rates. Offering interest payments on excess reserves at a fixed price should discourage banks from lending Fed funds at rates below the IOER rate. Instead, banks would face an incentive to borrow below IOER from Fed funds’ participants that are not eligible for IOER payments—Government Sponsored Enterprises such as Federal Home Loan Banks—and then hold those funds in reserve accounts that can earn IOER. This arbitrage process would bid up the Fed funds rate to IOER standards (Banegas & Tase, 2016).

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8 Interest on reserve payments consist of two separate interest rates: ‘interest on required reserves’, and ‘interest on excess reserves.’ Considering the low volume of required reserves and the importance of excess reserves, the following discussion focuses on the latter.
Almost from the outset, however, this expectation turned out to be incorrect as the effective Fed funds rate persistently traded below the IOER rate (Figure 5.3). In December 2008, the Fed accepted this situation by setting IOER at 25 basis points, while communicating a target range for the Fed funds rate of 0 to 25 basis points. For the Fed’s normalisation strategy, this was highly disconcerting—there was simply no reason to believe that once the Fed would raise IOER rates, other market rates would follow. Initially, Fed officials sought to allay concerns about the behaviour of IOER. In a speech in 2009, Bernanke attributed the unwillingness of banks to fully arbitrage the gap between the IOER rate and the effective Fed funds rate to a lack of balance sheet capacity. Banks were seeking to control their balance sheets more tightly to avoid breaching newly introduced regulatory capital and leverage ratios. At the same time, other Fed fund market participants such as GSEs were limiting their trading as they were dealing with changes to risk management practices and crisis-induced credit losses (cf. Bernanke, 2009b). Yet whereas Bernanke expected these problems to be reduced with time as market conditions improved, the Fed funds rate has stayed consistently below IOER—forcing Fed officials to problematise the relationship between IOER and a changing market environment more comprehensively.

The key reason that was identified for the persistent impairment of the transmission mechanism was the interaction of IOER with new macroprudential regulations. In April 2011, the FDIC implemented a change to its assessment base on which fees are levied to build up the FDIC insurance fund. Before the change, US-chartered banks
only paid insurance fees on their domestic deposits. Under the new rules, mandated by the Dodd-Frank Act, the assessment base was expanded to include total assets less tangible equity. Effectively, the change increased the regulatory cost on wholesale sources of funding, and slightly reduced the regulatory cost of deposits (to keep the measure revenue-neutral). The idea behind this change was to increase the burden of payments on larger banks as to better reflect market shares within the industry and roll back favouritism shown to large banks by Basel II (Banegas & Tase, 2016). The new rule almost did not make it into the final bill. Drafted behind the scenes by the FDIC and introduced by Republican Senator Susan Collins, the Amendment was met with fierce opposition by the banking industry. It also attracted the criticism of the Fed and the Treasury, who considered setting capital requirements their regulatory prerogative and sought to keep such issues out of Dodd-Frank. In the end, the Collins Amendment prevailed (Tooze, 2018, p. 307).

By squeezing profit margins on wholesale funding, the immediate effect of the assessment base change was a shift in US bank funding away from wholesale and offshore dollar funding and towards domestic deposits. In this regard, the shift away from volatile short-term wholesale funding and towards deposits can be attributed as a success of the new regulation. At the same time, however, the FDIC change also undermined trading in the Fed funds market, as it made reserve balances funding in wholesale interbank markets more expensive and undercut US banks’ incentive to engage in the kinds of arbitrage trades that would lift the effective Fed funds rate towards IOER. As a result, trading volumes in the Fed funds market continued to collapse, from $89 billion in early 2010 to a mere $54 billion by end-2011 (Kreicher et al., 2013, p. 8). The Fed’s loss of regulatory control over capital requirements thus immediately had a broader effect on its traditional target rate.

The implementation of the FDIC assessment base changes coincided with QE2, which supercharged the effects of the regulatory change. The Fed’s new round of asset purchases and the adjacent injection of reserve assets that can only be held by the banking system represented a problem for US-chartered banks to the extent that banks relied on wholesale markets to fund these new reserve assets on their balance sheets.

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9 QE2 started in November 2010, when the FDIC first published proposals for its assessment base change. As banks were anticipating the changes to come into effect, they were adjusting their balance sheets.
As such, US banks had every incentive not to bid for the Fed’s new reserves themselves. As the Fed was purchasing Treasury bonds from non-bank investors, however, banks could benefit from an influx of deposits as the Fed credited the investor’s bank account. In total, non-bank investors increased their holdings of deposits by $240 billion, accounting for almost half of US banks’ deposit growth during QE2 (Kreicher et al., 2013, p. 14).

The situation was markedly different for the US branches of foreign banks. Foreign banks that operate in the US via a branch, as opposed to a separately capitalised subsidiary, are legally precluded from raising FDIC-insured deposits. As a result, the FDIC changes had no bearing on their operations, allowing foreign banks to take on a disproportionate share of the reserves issued by the Fed to pay for Treasury purchases under QE2. Overall, foreign bank branches took roughly two-thirds of newly issued reserves. The share was even more disproportionate than it had been during QE1, when foreign banks took one-third of new reserves. During QE1, European banks had been a particularly keen taker of Fed reserves, seeking to substitute faulty securitised products for highly liquid reserve balances. As Tooze (2018, p. 210) put it, the Fed worked ‘hand in glove with the European megabanks to unwind the transatlantic balance sheet’. During QE2, however, this situation had shifted: as Euro area banks were hit by severe funding difficulties induced by the Euro crisis, their build-up of Fed reserves was outmatched by that of Japanese, Swiss and UK banks. Nor was the reserve up-take a mere exercise in cleaning up balance sheets: across the board foreign bank branches funded their holdings of reserves not by reducing loans or other assets, but rather by attracting new dollar funding in global markets (McCauley & McGuire, 2014).

The combination of QE2 and the FDIC assessment base change induced a shift in global money flows. Prior to the global financial crisis, the US branches of foreign banks had played a key role in funding the dollar balance sheets of their parent banks by drawing on funding from US money market funds and other wholesale market lenders. Following the FDIC regulatory change, this situation reversed: US branches were relying on their affiliates outside of the US to fund their asset growth, turning

10 My interpretation runs contrary to Tooze (2018), whose claim that European banks were ‘running down their US securities portfolios and building up Fed cash balances’ is not substantiated by his own references (cf. McCauley & McGuire, 2014)
from net lenders of about $400 billion pre-crisis to net borrowers of $200 billion by 2013. The global funding practices of US banks equally reversed. Traditionally, US banks had booked deposits in offshore branches and repatriated funds as wholesale Eurodollar funding to avoid the FDIC surcharges. Yet once wholesale funding attracted FDIC surcharges, such accounting gimmicks became not just pointless, but outright counterproductive (McCauley & McGuire, 2014, pp. 92-93). By rebooking these deposits from offshore branches onshore, US banks managed to increase their deposit-to-asset ratio (Kreicher et al., 2013). Within a few months, transatlantic cross-border banking developments that had taken shape since the turn of the century had been unwound. Contrary to the narrative championed by critics, the Fed’s QE2 programme represented not a ‘flooding’ of global markets with dollar liquidity. Instead, it helped repatriate dollar funds into American markets, and increased foreign banking participation in US markets.

The interplay of the FDIC regulatory change and QE2 offers a first but highly instructive example of how macroprudential regulation and monetary policy can interact. Regulatory changes have the capacity to exert an independent effect on money market relationships that could run counter to the interests of monetary policy and weaken the Fed’s control over its transmission mechanism if the interplay between regulatory changes and monetary policy tools is not sufficiently problematised. For the Fed, this means that going forward, monetary policy could no longer be cleanly disentangled from its macrofinancial environment and associated macroprudential regulatory settings. In problematising its own policy tools and designing suitable policy levers that would aid the process of monetary policy normalisation, the Fed would thus have to take macrofinancial factors closely into account.

In this case, the need for some form of coordination was all the more apparent given that the FDIC base change meant not just a weakening of Fed funds trading, but also tightened the links between global and domestic dollar markets, leading to a greater role of foreign banks in global dollar intermediation. To the extent that these banks operate outside of the regulatory purview of the Federal Reserve, these developments pose the potential to disrupt the Fed’s control over money market conditions further. In turn, the growing linkages between global and domestic dollar markets were making the need for international central bank coordination, such as via liquidity swap lines, more likely. The institutionalisation of a standing swap network between six key
advanced economy central banks in November 2011 that promises unlimited foreign currency liquidity when needed, and the indefinite extension of the network in 2013, offers one indication of this new reality.¹¹

The ongoing collapse of Fed funds trading—increasingly dominated by a handful of foreign banks and domestic FHLBs—raised important questions about the Fed’s ability to control interbank rates. With IOER functioning *de facto* as a ceiling for the effective Fed funds rate, Fed policymakers confronted the uncomfortable question of whether IOER would be a sufficient instrument to raise interest rates in the future and aid the normalisation of monetary policy. The issue that confronted the Fed was that while it could raise the ceiling on interest rates, it had no guarantee that other market rates would follow. What was lacking, in other words, was an interest rate floor that could be used to ‘push’ rates upwards in an ample reserves environment. Despite the introduction of IOER, the Fed’s control over short-term money market rates was far from secured. To address this problem, the Fed sought to develop another highly consequential tool for controlling money market rates—this time, a rate that would operate outside of the unsecured, interbank market.

### 5.2.2. The Reverse Repurchase Facility

In July 2013, Fed staff presented the option to introduce an overnight reverse repurchase agreement (RRP) facility. By offering repos to a broad set of counterparties, including non-banks that are significant participants in money markets, the new facility would seek to put a firm floor under market interest rates.¹² After a set of operational exercises indicated the effectiveness of such a facility in controlling short-term interest rates, the Fed announced in September 2014 that the RRP facility would play an important supplementary role to the IOER rate during policy normalisation (Federal Reserve, 2014).

While the Fed had previously relied on reverse repos as part of its open market operations, the new facility proved to be a game changer in several ways. For one, it greatly expanded the number of counterparties the Fed directly interacted with. In the

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¹² The name of the facility is misleading as it is a ‘reverse repurchase agreement’ from the perspective of the private counterparty, and not from the Federal Reserve.
words of one market observer, the new facility ‘effectively grants shadow banks—dealers and money funds—a checking account at the Federal Reserve for the very first time in US monetary history, similar to how reserves held at the central bank function as a checking account for traditional banks’ (Pozsar, 2014, p. 22). Whereas traditional open market operations had been sporadic and confined to a small subset of market participants known as primary dealers, the new facility operated daily, at a pre-announced rate, and engaged with a broad selection of counterparties. Initially, some FOMC members such as President Lacker of the Federal Reserve Bank of Richmond expressed concerns that expansion of Fed access to hundreds of market participants would confer a competitive advantage to those actors and strengthen some shadow banking entities, including money market funds that had proven their run-prone nature during the global financial crisis (FOMC, 2013b, p. 14). The Fed’s ultimate position, however, was succinctly expressed by the Manager of the System Open Market Account Simon Potter, who acknowledged that despite the need for reform, money market funds ‘are a very large presence in money markets right now, and we can’t act as though they’re not there’ (FOMC, 2013b, p. 15). Just as the Fed’s asset holdings multiplied under QE, its liabilities were also becoming more diverse.

The introduction of the RRP facility arguably pushed the Fed closer towards the repo market. A key purpose of the RRP facility is to encourage arbitrage by a broader set of market participants. Simply put, the RRP facility offers an investment option for eligible market participants that becomes attractive to market participants if they can borrow securities in money markets at lower rates, which they can then invest at the Fed’s RRP facility. These arbitrage relationships, in turn, put upward pressure on money market rates, and thereby put a floor under interest rates more generally (Ihrig et al., 2015). Despite these purported advantages, however, internal Fed staff projections acknowledged that the RRP facility could draw activity out of the Fed funds market, which in turn could reduce the usefulness of the effective Fed funds rate as policy target (FOMC, 2013a, p. 10). The RRP facility thus presented an interesting puzzle for Fed policymakers: on the one hand, it promised a handy tool to aid the normalisation of interest rates under conditions of ample reserves. On the other hand, the new facility threatened to erode the centrality of the Fed funds rate itself for monetary policymaking by tying rate movements more closely to the repo market complex. While aiding the Fed’s ability to affect short-term interest rates, the facility
thus introduced a shift in what it means to control short-term rates: it favoured repo rates, rather than unsecured interbank rates.

To understand the interaction between IOER and the RRP facility more clearly, it helps to recap their respective functions. In terms of monetary policy, the purpose of the two rates was to produce a corridor for the effective Fed funds rate to trade in. In practice, however, the two administered rates had a strong direct effect on other short-term funding rates as well. Figure 5.4. offers a snapshot of money market rates throughout 2013 and 2014. First, consider the effect of IOER. On the asset side of their balance sheet, banks hold large amounts of excess reserve balances that were created by QE and yield 25 basis points due to the Fed’s IOER payments. To fund these assets, banks rely on deposits (not shown) and wholesale money market funding, including by issuing commercial paper. Such funding instruments generally trade below IOER rates simply because banks need to fund at a positive spread. One implication of this arrangement is that the Fed’s control over short-term interest rates hinges on the willingness of banks to pay up for funding and pass through changes in IOER (Pozsar & Sweeney, 2015, pp. 4-5).

**Figure 5.4. Money market rates at the zero lower bound (in percent)**

The RRP facility, by contrast, allows the Fed to regain some control over short-term rates by effectively inviting money market participants to bypass banks altogether. As
already noted, the facility offers eligible non-banks the option to rotate out of bank deposits and instead park their cash directly with the Fed. By manipulating the RRP rate, the Fed is able to influence how attractive the facility appears to money market participants, and effectively tighten or widen the short-term interest rate corridor. As Federal Reserve Board Governor Elizabeth Duke noted during the July 2013 FOMC (2013a, p. 11) meeting, the RRP facility ‘could be a very powerful tool because it would let us conduct monetary policy directly through the shadow banking system, in addition to going indirectly through the banks’. More accurately, the facility allowed the Fed to regain control over short-term funding rates not by sidestepping banks, but rather by shifting emphasis away from banks as depository financial institutions, and towards the broker-dealer affiliates within bank holding companies. The move towards the dealer complex—both bank and non-bank—thus signified a shift in importance away from unsecured rates and towards secured rates such as repo in the transmission of interest rate policy.

Affording greater significance to repo markets within the operating procedures of monetary policy has consequences for financial stability. By allowing non-banks to lend directly to the Fed, the facility allows non-banks to park their cash directly with the Fed, causing a shift in the composition of Fed liabilities away from reserves and towards the RRP facility. By directly entangling the Fed’s balance sheet with the operations of the shadow banking segment, this affords greater infrastructural power to non-banks (Braun, 2020), even though they remain outside of the remit of the strictest application of new macroprudential rules (Christophers et al., 2017). Yet while the pro-cyclical tendencies of repo markets were well known, the facility encouraged greater repo trading but offered no mechanism to curtail volatility in repo markets, as non-banks do not enjoy access to the Fed’s discount window. Through the facility, the Fed effectively acts as a ‘one-sided’ money dealer—that is, the Fed takes in deposits but refrains from ‘making markets’ by lending to shadow banks. During times of stress, when investors look for safety, a consequence of the RRP facility thus can be to ‘suck’ liquidity out of the system at the very moment that it is needed most (Pozsar, 2017b, p. 11), thereby leading to a funding squeeze that could see private market rates spike considerably.

As a policy tool, the RRP facility thus had money market effects that far transcend a simple monetary policy function—an issue that I will discuss in detail in the next
chapter. The most immediate effect of the facility was that in affording non-banks systemic importance yet without providing a suitable public sector backstop, it placed additional strains on the banking system to act as a private sector lender of second-to-last resort. For banks to be able to act in this fashion, however, they require elastic balance sheets. Yet as the next section will discuss, the introduction of new macroprudential regulations increasingly linked the ability of banks to function as elastic backstop for the private credit system to the size of the Fed’s balance sheet—creating a disconnect between the Fed’s monetary policy normalisation path and the reconfigured liquidity needs of the banking system.

5.3. Money markets under Basel III

On 1 January 2015, key aspects of the new Basel III regulatory framework came into effect in the United States. Coinciding with the end of the Federal Reserve’s third round of QE, the implementation of Basel III would once more change money markets in significant ways and reformat the Fed’s relationship to the (global) banking and shadow banking system. The new reforms would add significantly to domestic post-crisis regulatory changes, such as the Dodd-Frank Act. Taken by itself, Dodd-Frank had largely failed to reconfigure key money market relationships. Its main contribution was in enhancing consumer protection and affording the Fed additional powers to supervise and oversee the development of resolution plans for banks deemed as systemically important financial institutions—a measure designed to tackle ‘too-big-to-fail’ (Maxfield, 2011). Yet key themes, such as provisions for capital, leverage, and liquidity, were largely absent. Many of these omissions were strategic: Fed and Treasury officials wanted to retain the ability to shape crucial and intricate functions of the financial systems themselves (Tooze, 2018, p. 303). As a result of these efforts, regulatory oversight over the financial system remained highly fragmented in the US, and macroprudential tools limited (L. Goodhart, 2015).

By contrast, the internationally agreed Basel III provisions provided a comprehensive external regulatory framework for money market activity that would reshape banks’ balance sheet operations in significant ways. New regulatory measures—notably liquidity and leverage ratios—were putting in place quantitative constraints on
balance sheet expansion. As these new measures interacted with central bank balance sheet policies in unexpected ways, they would come to exert a strong effect on monetary policy implementation and shape the Fed’s space for policy normalisation—most significantly, they would limit the Fed’s capacity to taper its balance sheet.

5.3.1. Leverage and liquidity regulations: the end of ‘excess’ reserves

The Basel III provisions seek to reduce the vulnerability of banks to adverse liquidity conditions by using bank capital and holdings of liquid assets as shock absorption mechanisms against asset price volatility and funding problems. To that end, the new framework introduces higher liquidity and capital quality requirements while broadening the coverage of bank risks (BCBS, 2013). Two aspects of the Basel III framework in particular have rewritten money market conduct: the leverage ratio and the liquidity coverage ratio. Having identified a build-up of excessive on- and off-balance sheet leverage as an underlying cause of the global financial crisis, the introduction of a leverage ratio seeks to reduce the risks associated with periods of excessive leverage and the detrimental impact on credit conditions seen during periods of subsequent deleveraging. As a non-risk-based ratio, the Leverage Ratio is intended to act as a credible supplementary measure to other, risk-based capital requirements (Banegas & Tase, 2016). By limiting the scope of balance sheet expansion, such a ratio limits the ability of banks to compress credit spreads.

The Liquidity Coverage Ratio (LCR) is another key though usually underappreciated aspect of the new Basel framework. It requires that global banks hold reserves of 30-days’ worth of net cash outflows in high-quality liquid assets (HQLA). As such, the LCR impacts both the asset side and the liability side of banks’ balance sheets. On the asset side, it stipulates the requirement to hold HQLA, which include central bank reserves and certain marketable securities backed by sovereigns, such as Treasury securities and securities by some government-sponsored entities. Following preferences communicated by the Federal Reserve, banks’ HQLA portfolios maintain a sizeable share of central bank reserves. On the liability side, the LCR assigns pre-set outflow assumptions to banks’ short-term liabilities in order to calculate the amount of HQLA that banks are required to hold against them. The ranking of liabilities implicitly incentivises banks to divest from specific deposit types (so-called non-
operating deposits) that attract high HQLA requirements and thus leave the bank no freedom to decide how to invest on its asset side.\(^{13}\) The Federal Reserve started to phase in a Liquidity Coverage Ratio on 1 January 2015, with the largest US banks subject to daily LCR compliance requirements from 1 July 2015 (Pozsar, 2016b, p. 14).

A significant effect of the LCR is to place a structural demand for central bank reserves onto banks’ balance sheets. Whereas previously the reserves created by QE could be considered in ‘excess’ of what the banks were required to hold, under the new regulatory system the reserves held at the Fed (and other central banks) become the very basis of market liquidity. As discussed by Pozsar (2016b), this intertwines Quantitative Easing and Basel III in curious ways: banks need the reserves the Federal Reserve provides through its asset purchases to comply with the LCR.\(^{14}\) During the crisis, the reserves injected by emergency operations substituted for interbank lending when the latter collapsed. During QE, the dramatic expansion of reserves was generally seen as an inescapable by-product. Under the new regulatory regime, however, the reserves held at the Fed have become the system’s settlement medium. This introduces a quantity (rather than price) constraint on banks’ money market lending—namely, the size and composition of their reserve positions at the Federal Reserve.

To understand the significance of this shift, consider money market activity before these regulatory changes. During a typical day, a broker-dealer bank would deploy its balance sheet to arbitrage small differences in funding rates by offering buy and sell prices in specific securities and profiting on the spread between them. Generally, this involved buying in one market and selling in another as dealers leveraged their privileged access to specific money market segments (Grad et al., 2011; Mehrling, 2011; Nersisyan & Dantas, 2017; Sgambati, 2019). In stylised form, we can think of such activities as ‘matched book’ intermediation, as any increase in lending (such as a reverse repo) is matched by a corresponding increase in liabilities (such as repo). As a result, the size of the dealer’s balance sheet expands by the same amount on both

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\(^{13}\) Basel III assigns a much higher outflow probability to wholesale deposits than retail deposits, effectively forcing banks to invest disproportionately in safe but low-yielding HQLA when funding with wholesale deposits.

\(^{14}\) In recognition of these changes, the Federal Reserve ultimately dropped the word ‘excess’ from the IOER rate and now speaks of the rate for interests on reserves (IOR).
sides. In effect, the dealer would give up control over quantities—the size of the balance sheet at best an afterthought—to arbitrage away small differences in price.

Under Basel III, this situation is profoundly different. Whereas the leverage ratio places constraints on balance sheet growth, the LCR polices the composition of bank balance sheets. As shown in Figure 5.5., banks can either engage in matched-book intermediation until they hit their leverage ratio, or they can finance their repo lending position by ‘draining’ their reserve asset holdings at the Fed until they meet their HQLA limits. When selling off reserves to finance lending, banks do not impair their leverage ratio as their balance sheet stays constant but worsen their HQLA metrics as the composition of bank assets changes away from reserves and towards dollar lending (Correa et al., 2020). Together, these changes place a regulatory price on market liquidity by limiting private credit expansion, and instead link market liquidity to the size of the liquidity buffers that banks hold with their central banks. With limited space for arbitrage trades, banks’ lending capacity has become dependent on their ability to run down their reserve positions at the Fed to their regulatory minimum. Liquidity, as per Pozsar (2016c, p. 1) ‘is now stored outside the [private market] system.’ In this new system, the Federal Reserve is structurally implicated in maintaining money market liquidity through its balance sheet.

**Figure 5.5. Different forms of dollar intermediation**

The reason central banks need to maintain a sizeable reserve buffer is precisely that the exact amount of reserves needed by the banking system is near-impossible to
quantify, and varies considerably over time. The elasticity of the payments system thus becomes an increasingly complex and entangled governmental question: tweaks to regulatory requirements, variegation in the national implementation of regulatory standards, and divergences in interest rate and balance sheet policy settings across economies can all impact the demand for reserves and interact in unexpected ways. By linking liquidity provision in money markets directly to the Fed’s balance sheet, the Basel III framework thus poses important questions about the amount of reserves that the Fed can drain from its balance sheet before unduly squeezing financial activity.

5.3.2. *From excess reserves to excess collateral?*

As I have outlined in this chapter, the Fed’s case for policy normalisation rested primarily on macroeconomic factors. Fed officials considered unconventional practices primarily a question of unconventional monetary policy, and as such imagined that the unwinding of such policies would affect primarily the realm of monetary policymaking. The introduction of macroprudential policies makes such a position increasingly untenable, as it ties the liquidity profile of banks directly to the central bank’s balance sheet: despite the Fed’s capacity to raise short-term interest rates, its ability to taper its balance sheet thus would run into quantitative limits. The importance of the distinction between a macroeconomic and a macrofinancial analysis of policy normalisation can be illustrated by thinking more concretely about the effects of balance sheet taper. As Fed officials imagined, the taper would tighten financial conditions by affecting long-term yields (Dudley, 2017). As I have argued above, from a macrofinancial perspective taper would also tighten conditions by removing balance sheet capacity for the settlement of trades: as taper adds collateral to markets and removes (settlement) reserves, it limits the capacity of banking institutions to intermediate freely.

The perspective outlined here departs in important ways from that advanced in the work of Manmohan Singh and various co-authors based at the International Monetary Fund (Singh, 2017; Singh & Goel, 2019; Singh & Wang, 2017). Singh had emerged as the foremost expert on collateral plumbing in the wake of the global financial crisis and has been an important critic of central bank balance sheet policies. In his
interpretation, rate hikes and balance sheet reductions differ qualitatively: while rate hikes lead to an unambiguous tightening of financial conditions, balance sheet reductions ease financial conditions as they alleviate a global safe asset shortage and increase collateral velocity. Following the global financial crisis, collateral velocity—that is, the reuse or re-hypothecation of collateral in the inter-dealer repo market—had been subdued, first due to crisis-induced deleveraging and central bank asset purchases, and more recently due to new regulatory restrictions on balance sheets. Once the Fed pursues balance sheet taper, however, collateral velocity increases again as the Fed releases ‘good’ collateral such as Treasury securities into markets and reduces bank reserve positions.

Singh sees several advantages to collateral over reserves. The main difference is that while reserves remain ‘idle’ on the central bank balance sheet, collateral, due to reuse in the interdealer market, circulates and thereby ‘lubricates’ financial markets (Singh & Goel, 2019, p. 12). The importance of tapering thus comes not just from releasing collateral into the market, but also from shrinking the Fed’s overall footprint in money markets. New central bank facilities such as the Fed’s reverse repurchase facility had contributed to disintermediating dealer activity by offering investors such as MMFs an outside investment option, effectively compensating for the lack of good collateral in markets. By diverting funds away from the dealer complex and increasing ties between shadow banks such as MMFs and the Fed, such facilities effectively ‘rust the plumbing’ of financial markets. Since only inter-dealer repo can be re-hypothecated, the return to a ‘lean’ central bank balance sheet would re-direct flows through the dealer system and return collateral velocity to healthier levels.

Singh’s intervention is useful in highlighting the macrofinancial dynamics at play in the Fed’s balance sheet taper. Yet his analysis about financial easing hinges on the prediction that regulatory restrictions on balance sheets will be eased: it is only with unconstrained balance sheets that dealers can leverage their operations sufficiently to turn collateral into cash at a moment’s notice (see for instance Singh, 2017). By contrast, in the context of constrained private sector balance sheets, reserves and collateral are not interchangeable. Whether banks have primarily reserves or bonds in their HQLA portfolio matters for how they fund their money market activities. When banks can make use of sizeable reserve holdings, they can run down their balances at the Fed during their intraday activities. The increase and decrease of reserve balances
across banking institutions associated with daily payment flows settles on the Fed’s balance sheet and leaves money market rates unaffected. The situation is markedly different once bank HQLA portfolios consist primarily of bonds such as Treasuries, rather than reserves (Pozsar, 2018d). While considered equally ‘liquid’ by regulatory metrics, banks cannot use bonds to settle transactions. Instead, they must first convert them into reserves—either by selling them or by repoing them.

Before macroprudential reforms, repo markets offered the option to convert bonds into just-in-time settlement liquidity as balance sheet space was effectively endless and the high velocity of collateral markets offered ample opportunities to obtain the reserves needed for settlement. But with liquidity and leverage restrictions, selling or repoing bonds drains liquidity from other banks and imprints on overnight money market rates. In undoing its QE-bond portfolio, the Fed is thus making bank HQLA portfolios less liquid and forces banks to tap the repo market on the margin to raise reserves for their settlement needs: far from sitting ‘idle’, reserves thus continue to perform a crucial function within the operation of the payments system. In contrast to Singh, increased velocity of collateral amidst funding market stress should thus be interpreted as a sign of financial tightening as dealer banks pay a premium to convert bonds into settlement reserves. Put another way, when balance sheets are constrained, the key variable for assessing the overall ease of financial conditions is not velocity, but the price of money.

The difference between reserves and bonds introduces another complication: in markets that are repo-centric and balance sheet constrained, the Treasury becomes an increasingly important money market actor as a ‘collateral factory’ (Giovannini, 2013). Just as the central bank’s balance sheet unwind adds collateral to markets, the Treasury’s debt and cash management strategies shape collateral supply, with effects that are potentially distinct from those intended by the central bank. Following the introduction of Quantitative Easing, the role of central banks as quasi-fiscal actors has received considerable attention in the literature (e.g. Braun, 2018; Fontan et al., 2016; Tucker, 2018). By contrast, the money market impact of the Treasury is far less well understood. A notable exception is the work by Carolyn Sissoko (2020), who has highlighted the growing importance of a ‘collateral channel’ of monetary policy.

15 With LCR and SLR restrictions, these trades put additional pressure on the cost of balance sheet expansion for following trades (cf. Pozsar, 2017b, pp. 8-9).
According to Sissoko, the shift from unsecured to secured or collateral-intensive funding markets means that markets are more sensitive to Treasury funding needs. As dealers seek to finance sovereign debt in the repo market, the need to roll over funding on a constant basis can create funding pressures that move money market rates more broadly. Adding to the Treasury’s role as quasi ‘shadow central bank’ (Gabor & Vestergaard, 2016) and collateral provider for the shadow banking system, these funding dynamics can have a significant impact on monetary policy transmission. The problem for the Federal Reserve then consists in having to offset the repo market funding pressures generated by changes in the collateral supply provided by the government.

Considering these shifting boundaries between central bank and Treasury, Singh’s assertion that central bank balance sheet unwinding will return the dealer complex to its ‘normal’ function thus seems questionable. Taper is unlikely to address changes in market structure that have contributed to the shifting boundaries between monetary and fiscal policy. Similarly, the idea that returning elasticity to the dealer complex depends on unwinding post-crisis changes in central banking and shadow bank regulation ignores the systemic instabilities that have given rise to regulatory changes in the first place. Within a market environment that places a regulatory price on balance sheet space, the alternative is to recognise a need for increased monetary-fiscal coordination in the interest of financial stability. The need for coordination becomes more pressing as the Fed shrinks its outsized footprint in money markets, a lesson that arguably runs against the ideas that animated the Fed’s normalisation drive.

In summary—and as I will discuss in more detail in the next chapter—the Fed’s policy normalisation process (most significantly, balance sheet taper) can exacerbate funding pressures by slowly eroding reserve positions within banks’ HQLA portfolios, effectively tightening their ability to ‘drain’ reserves for money market lending. Due to the settlement pressures outlined above, the shift from reserves to collateral does not by itself ease financial conditions. In contrast, it creates new and unexpected trade-offs by affording the Treasury—a key source of collateral due to its fiscal policy and debt management practices—an outsized role in money markets. Absent broader coordination between the effects of macroprudential regulation, monetary policy, and fiscal policy on money market liquidity conditions, this suggests that the Fed has only one viable option: it will have to adopt a de-risking stance—either by underwriting
bank balance sheet expansion through a permanently enlarged central bank balance sheet, thereby abandoning monetary policy normalisation; or by side-stepping banks and counter funding pressures in specific market segments by lending to a broader set of counterparties directly.

5.4. Conclusion

In the post-crisis period, the Federal Reserve’s money market footprint has expanded dramatically. This expansion was owed to the fact that the Fed had taken on an increasing burden as macroeconomic manager, effectively seeking to stimulate aggregate demand through monetary easing in the absence of fiscal stimulus. To that end, the Fed’s large-scale asset purchases known as Quantitative Easing sought to directly manipulate the price and yields of long-term assets. A by-product of QE was the expansion of bank reserve positions: though generally ignored in macroeconomic accounts of QE, the critical macrofinance approach adopted in this thesis allows us to see how the new ample reserves environment forced the Fed to confront and problematise the intricate ways in which macroprudential regulatory changes would intrude on the operations of monetary policy. Under the post-crisis macrofinancial architecture, macroprudential regulations not only placed direct limits on private financial intermediation; they also afforded fiscal and debt management functions greater importance in money markets by shaping the availability of collateral. In the post-crisis environment, monetary-fiscal-financial interactions would thus increasingly shape the scope and reach of monetary governance.

Rapid changes in financial structure and the role of the central bank within them thus prompted Fed officials to problematise their own operational mechanisms and devise new policy levers that could aid their control over monetary conditions. As this thesis maintains, attention to such changes in the technical conduct of central banking carries great importance if we are to understand the shifting role of central banks within modern markets (see Chapters 2 and 3). As this chapter has shown, the Fed prevaricated between a macroeconomic and macrofinancial approach to financial governance in its post-crisis strategy: whereas its political legitimacy and mandate remains closely wedded to macroeconomic categories, and Fed officials thus
continued to impart great significance onto macroeconomic indicators, shifts in the macrofinancial architecture of finance have increasingly forced a problematisation of the technical mechanisms through which Fed policy is implemented. As I discuss in the next chapter, the lack of coordination between these policy objectives—and the resultant neglect of the interplay of monetary-fiscal-financial considerations in setting policy—would play a key role in derailing the Fed’s policy normalisation strategy, thus ultimately pushing it into an accommodative, de-risking stance to contain the contradictions of its governance approach.
Starting in 2015, the Federal Reserve began its long-awaited policy normalisation process and the associated ‘exit’ from QE. In December, the Fed raised interest rates for the first time since the crisis by increasing its administered IOER rate by 25 basis points. Further hikes would follow from December 2016 onwards, until IOER reached 240 bps in mid-2019. In a second step, from late 2017 onwards, the Fed started to reduce the overall size of its balance sheet. In total, aggregate reserve balances fell from a height of $2.8 trillion after the end of QE3 to about $1.7 trillion by September 2019. Whereas rate hikes tighten financial conditions through the familiar short-term interest rate channel, the reversal of QE reduces the Fed’s asset portfolio and puts pressure on long-term bond yields. Tapering the size of the Fed’s overall balance sheet effectively shrinks the amount of reserves in the system and increases the supply of safe asset collateral, thereby shifting financial intermediation away from the Fed’s balance sheet and back towards collateral-intensive private financial intermediation.

The Fed’s discussion about policy normalisation was driven almost exclusively by macroeconomic considerations. As the previous chapter has shown, momentum in favour of normalisation increased during 2014 and 2015, as Fed officials became increasingly concerned about the potential build-up of inflationary pressures due to the prolonged low interest rate environment. In this context, higher short-term rates were considered a vital first step in creating the headway for future rate cuts if economic conditions were to deteriorate (Yellen, 2014). While Fed officials came to favour interest rate hikes over balance sheet taper due to their greater familiarity with the mechanism, on an operational level the Fed considered the effect of rate hikes and taper as affecting domestic macroeconomic variables such as output and inflation in qualitatively similar ways. In tightening financial conditions, both measures would have near-identical effects on aggregate domestic activity (Dudley, 2017). Less
attention was given to the differential effect of both measures on financial markets: beyond a general intention to curb excessive risk-taking on the part of financial firms that had become accustomed to easy money, speeches by Fed officials and FOMC transcripts show remarkably little reflection on systemic issues such as the effect of the new macroprudential regulatory environment on the monetary policy transmission mechanism (for a brief discussion, see FOMC, 2016a).

In line with the analysis pursued in this thesis, this chapter departs from the macroeconomic interpretation that dominated monetary policy thinking. Instead, I adopt a critical macrofinance lens more attuned to questions of market structure and financial stability. While macrofinancial themes were initially not prominent within the Fed’s monetary policy thinking, I argue that a critical macrofinance perspective offers a unique vantage point for understanding both the impact of macroprudential regulations on money markets, and the resulting contradictions that would come to shape the Fed’s monetary policy normalisation process. Indeed, as I show in this chapter, it was precisely because the Fed paid insufficient attention to macrofinancial issues within its monetary policy thinking that its normalisation strategy was ultimately derailed. Instead of simply removing monetary policy accommodation, it increasingly confronted liquidity as a complex and entangled governmental issue, shaped by monetary policy, financial stability regulation, and fiscal policy decisions. Governing effectively thus required first and foremost finding ways of aligning the conduct of central banking with those market structures and policy processes that shape the macrofinancial architecture of the monetary system. Yet by using the pre-crisis setting as a baseline for its monetary policy decisions, the Fed consistently overestimated the amount of ‘excess’ reserves in the system and as a result excessively tightened liquidity.

Based on this assessment, I analyse the September 2019 repo spike as a policy-induced credit crunch in the shadow banking system: the Fed’s turn to monetary tightening adversely affected the channels of financial intermediation and brought the contradictions in the Fed’s liquidity governance to the fore. Just as the 1966 credit crunch triggered intricate institutional reconfigurations, the 2019 repo spike proved highly consequential as it prompted the Fed to realign its policy apparatus with the contemporary macrofinancial market environment—most notably, by addressing funding pressures in specific market segments by turning into a repo lender of last
resort. While the Fed’s course correction was quickly overshadowed by the market turmoil caused by the onset of the Covid-19 pandemic, the September 2019 interventions herald the beginning of a transformation in the Fed’s macrofinancial role—most notably, the Fed came to accept the need to act as an elastic backstop for the repo market and thereby de-risk the operations of the shadow banking system more broadly. In analysing the Fed’s money market operations from the perspective of critical macrofinance, the chapter thus makes an important contribution towards answering the second research question set out in this thesis—namely, how contradictions between monetary, fiscal, and financial stability policy have come to shape the evolution of the Fed’s post-crisis policy.

The chapter is organised into four sections. The first section introduces the tools available to the Federal Reserve to aid its balance sheet taper and highlights the special role of repo facilities and the US Treasury in shaping the collateral supply, thus giving vital context for the macrofinancial analysis in this chapter. The next two sections trace the migration of funding pressures empirically across global money markets and into the heart of the US financial system. Section two focuses on offshore funding pressures in the FX swap and Libor market and assesses the impact of shifting global funding patterns on US repo markets. Section three discusses domestic changes in the US repo market and analyses the events leading up to the repo spike in September 2019. Section four concludes by way of discussing the implications for the Fed’s policy normalisation agenda.

6.1. The Federal Reserve and the US Treasury during normalisation

The Federal Reserve’s policy normalisation process depended on two mechanisms: interest rate hikes and balance sheet reductions. While the tools behind interest rate changes have been extensively discussed in the previous chapter, the mechanisms for balance sheet taper require closer examination before discussing the Fed’s normalisation process. In essence, the Fed can manipulate reserve balances through two distinct mechanisms: first, by reducing the size of its overall balance sheet through the sell-off of assets, leading to an offsetting decline of reserve balances; and second, by shifting the composition of liabilities away from reserves and towards other
facilities. Here, the Federal Reserve has in effect three distinct options: (i) to encourage investment in the reverse repurchase facility (RRP) that it had set up in 2013; (ii) to encourage investment on the part of foreign central banks in the foreign reverse repo facility (F-RRP) also known as the foreign repo pool; and (iii) to accept higher cash balances from the US Treasury in the Treasury General Account (TGA). Figure 6.1. shows an overview of these facilities and their effect on reserve balances. It shows that already before the Fed began its balance sheet taper in October 2017, the ‘shadow taper’ induced by liability restructuring drained reserves from $2.8 trillion at the end of QE3 to a low of $1.9 trillion by end-2016.

Figure 6.1. Reserve draining facilities ($ billion)
As the previous chapter has shown, the Fed introduced the RRP facility to increase its effectiveness in controlling short-term interest rates. By offering an outside investment option to certain non-bank actors, the facility effectively placed a floor under money market interest rates (Ihrig et al., 2015). Yet by disintermediating the non-bank-dealer complex, the RRP facility also has the effect of removing reserves from the system. We can think of the RRP facility as providing an investment option for funds (reserves) that clearing banks do not want to retain and other dealer-banks do not want to borrow due to balance sheet restrictions or a lack of arbitrage opportunities. As such, the RRP facility functions as a true indicator of excess reserves—any funds that non-banks such as MMFs place with the Fed are funds that are effectively not wanted by the banking system. Conversely, use of the RRP facility dropped to zero in 2018 once reserve scarcity forced banks to bid actively for funds (Pozsar, 2019a).

Figure 6.2. shows the disintermediating effect of the RRP. In a typical money market transaction, a dealer borrows funds from a cash-rich but risk-adverse investor such as a money market fund at the tri-party repo (TPR) rate and lends at the slightly higher GC repo rate to collateral providers such as hedge funds, thereby earning an intermediation spread. The hedge fund will receive the cash in the form of a deposit in their name at a clearing bank, which in turn keeps reserves against those deposits with the Federal Reserve. Once the tri-party repo rate drops below the Fed’s RRP rate—in effect, once dealers do not bid sufficiently highly for funds—non-bank investors such as money market funds or dealers place their funds directly with the Fed, thereby disintermediating the previous chain of money market activity.

Figure 6.2. Reverse Repurchase Facility

<table>
<thead>
<tr>
<th>Federal Reserve</th>
<th>Clearing Bank</th>
<th>Hedge Fund</th>
<th>Dealer</th>
<th>Money Market Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves RRP</td>
<td>Reserves Deposit</td>
<td>Deposit GC</td>
<td>GC TPR</td>
<td>TPR RRP</td>
</tr>
</tbody>
</table>

The second reserve-draining facility available to the Fed is the foreign repo pool. Like other central banks, the Federal Reserve—via the Federal Reserve Bank of New York—maintains deposit and custody accounts for foreign monetary authorities to facilitate cross-border payments. Since the mid-1970s, the Fed has offered the foreign
repo pool as an investment service for these foreign account holders to support their daily cash management needs. The pool enables foreign authorities to invest certain cash balances at the end of the day in an overnight repo agreement under which securities are purchased from the Fed’s securities holdings. For foreign authorities, the facility is attractive as it offers the option of earning a return on cash balances that would otherwise sit idle. The size of this facility has traditionally remained relatively small, averaging at around $30 billion before the financial crisis. In the years after the crisis, use of the facility increased markedly to about $100 billion in 2015, in part reflecting a greater preference for dollar liquidity cash buffers on the part of foreign central banks since the experience of the crisis. Since 2015, use of the facility has increased significantly after the Fed removed constraints on the ability of its customers to vary the size of their investments (Potter, 2016).

The uptick in the facility’s use has assisted the Fed in reducing reserve balances. When using the facility, foreign authorities—such as foreign central banks—shift their dollar balances out of the private banking system and onto the Fed’s balance sheet directly. For the banking system, the resulting withdrawal of deposits shrinks the corresponding level of reserves they hold at the Federal Reserve. For the Fed, in turn, investments in the foreign repo pool essentially mean a liability swap away from bank reserves and towards repo (Figure 6.3.). Instead of trading out of bank deposits directly, foreign central banks can also reduce their outright holdings of US Treasury bills in favour of investments in the foreign repo pool (Figure 6.5.). As noted by Pozsar (2016d), it appears that at certain times the Fed has priced the foreign reverse repurchase rate opportunistically above certain private market rates, such as the rate for 1-month and 3-month Treasury bills to induce the rotation out of bills and into the foreign repo pool. By reducing reserve balances at their corresponding clearing banks, the rotation out of bills drains reserves in the same way as a direct rotation out of deposits.

Figure 6.3. Foreign Repo Pool
Finally, reserves can also be drained from the banking system through investments in the Treasury General Account. Unlike with the other two facilities, the Federal Reserve has relatively little influence over the size of this account, which is instead determined by the US Treasury. Like any financial institution, the Treasury maintains a cash buffer to cover its current expenditures. Such a working balance is of particular importance as income flows (such as the proceeds of debt issues and taxation) never precisely match disbursements (such as spending on social security) in timing and amount. Especially around specific tax and financing dates, and more recently whenever political debate turned towards the debt ceiling, the Treasury has found it necessary to maintain large cash buffers at hand to increase its bargaining power.

The Treasury has two distinct accounts for this purpose: the TGA with the Federal Reserve, and the Treasury Tax and Loan (TT&L) Accounts with depository institutions. Investments in the TGA have a direct money market impact as they shift funds (e.g. when the Treasury sells bonds) out of the banking system and onto the Fed’s balance sheet directly, thus draining reserves from the banking system. Given the Treasury’s sizeable funding needs, the build-up of large balances in the TGA can have a significant impact on reserve balances. Under the reserve scarcity regime prevalent before the crisis, such shifts would require constant offsetting action on the part of the Fed to keep the demand for reserves, and therefore the Fed funds rate, unaffected.\textsuperscript{16} To avoid this situation, the Treasury has generally kept funds in the TT&L accounts with depository institutions.

Since the global financial crisis, the Treasury has shifted its funds to the TGA for two main reasons. First, as the Fed’s emergency loan programmes expanded rapidly after the failure of Lehman Brothers, the Treasury coordinated with the Fed to deposit with the Fed directly and thereby drain reserves from the banking system to reduce the volume of excess reserves. The second reason was that once the Fed funds rate hit the zero lower bound and the Fed started paying interest on excess reserves at 25 basis points, the Treasury had an economic incentive to keep funds directly with the Federal Reserve. As balances in the TT&L accounts are structured to yield 25 basis points less

\textsuperscript{16}This happened between 1974 and 1978, when TGA balances saw large fluctuations as the Treasury shifted its operations from the TT&L to the TGA, forcing the Fed to engage in offsetting open market operations. A key reason was that at the time, banks were prohibited from paying interest on demand deposits, and the Treasury lacked the authority to invest in other, short-term earning assets. The situation changed in 1978 following a reorganisation of the TT&L accounts (Brewer, 1977; Santoro, 2012).
than the Fed funds rate, and therefore yielded zero after the crisis, it became more remunerative for the Treasury to keep its money in the TGA. While TGA balances also pay zero interest, the Federal Reserve remits its income from its System Open Market Account portfolio to the Treasury. Once the Fed started paying interest on excess reserves, it was thus also in the Treasury’s interest to drain reserves via TGA investments and keep the amount of IOER payments by the Fed as small as possible (Santoro, 2012).

**Figure 6.4. US Treasury Operational Cash Balances ($ billion)**

The TGA is relevant for understanding another important aspect of money markets as well. While the Treasury ultimately makes a profit from the Fed’s portfolio earnings, in real time, investments in the TGA mean negative carry for the Treasury: while TGA balances yield zero, the Treasury still has to fund these assets by issuing liabilities. To minimise negative carry, the Treasury funds the TGA balance by issuing short-term bills. An increase in the TGA thus both drains reserves from the banking system and adds to the supply of Treasury bills in the market, which in turn has a direct effect on repo rates (Pozsar, 2017a). The relationship between bills and repo comes down to their liquidity profile: while both bills and repo are generally considered highly liquid investment options, bills offer better intra-day liquidity as they can be sold at any time during the day. By contrast, both the tri-party repo market and the Fed’s reverse repo facility return cash at 3.30pm on the next day. For this simple reason, actors such as money market funds that do not have access to the bilateral repo market (that returns cash at 9am) tend to invest in T-bills to improve their liquidity profile. In turn,
whenever the Treasury increases its TGA balances and issues new bills, the ‘abundance discount’ of the new issue pushes bill prices down and bill yields up. Higher yields increase the attractiveness of bills as an investment, leading MMFs to reduce their lending in the tri-party repo market. Lower tri-party repo lending then forces dealers to replace repo funding with GC repo sourced in the inter-dealer market from dealer banks, which puts strains on GC repo rates and incentivises dealers to bid more for funding in the tri-party repo market, thereby pushing up rates (Pozsar, 2018d, 2019a).

Figure 6.5. Treasury General Account

Figure 6.5. shows the rotation on the part of non-bank investors such as money market funds out of repo and into bills, a process that can be aided by foreign central banks’ uptake of the foreign repo pool. Through this movement, bill yields effectively push upwards repo rates and can potentially shift short-term interest rates outside of the target range set by the Fed itself—a situation that I will return to later in this chapter. Throughout taper, the role of bills in this regard only increased, as the Treasury was effectively reissuing the bonds that the Fed let roll off its balance sheet in the form of bills.

The independent effect of the TGA on reserve balances raises the question of monetary-fiscal coordination. Here, the Federal Reserve could have accommodated the bills glut by adjusting the interest rate on the foreign repo pool, thereby incentivising foreign central banks either to absorb or trade out of bills. Yet after making investments in the foreign repo pool more attractive in 2015, the Fed did not appear willing to use this pool as a proactive policy tool through which to shape global investment patterns. As a result, at times the foreign repo pool has exacerbated rather than counteracted movements in the TGA. In light of the growing influence of the TGA on money markets, by 2019 Fed officials came to recognise the need to maintain
a somewhat larger reserve buffer for banks to accommodate fluctuations in the TGA (Logan, 2019).

Absent broader monetary-fiscal cooperation, the problem that confronted the Federal Reserve was that while its policy tools allowed it to tighten financial conditions, it lacked the appropriate tools to add elasticity to the payments system. While the Fed could add liquidity through the established channels—such as the discount window, central bank swap lines, and QE-type asset purchases—and thereby ease the reserve constraint on the banking system, the Fed lacked a direct backstop for the repo market: that is, a facility that would accept collateral against cash. In collateral-intensive markets in which funding pressures would imprint directly onto repo rates, rather than conventional interbank market rates, such a repo facility would offer the Federal Reserve a potential mechanism to adjust funding pressures arising from Treasury debt issuances. In short, a repo facility would allow the Fed to de-risk repo market volatility even without committing to overt coordination with the US Treasury. The remainder of this chapter traces the developments that pushed the Fed in this direction.

### 6.2. Global money markets and shifting funding patterns

Having outlined the Fed’s tools for policy normalisation, this section empirically analyses the impact of the interplay of monetary, fiscal, and macroprudential policies on money markets between 2015 and 2019. Adopting a global perspective, I show how funding pressures have emerged across a set of distinct but interconnected money market segments. First, from 2015 to 2017, structural funding pressures showed up in the FX swap market as global banks adjusted their lending behaviour to Basel III regulations. Second, from 2017 to 2018, funding pressures migrated from the FX swap market to unsecured LIBOR markets as foreign banks responded to US tax reform and the ramping up of US Treasury debt issuance. Third, in late 2018, funding pressures emerged in domestic US repo markets as foreign buyers exited the US Treasury market following the inversion of the yield curve.
6.2.1. Funding strains in the FX swap market

Within economics, covered interest parity (CIP) is the idea that interest rates implicit in foreign exchange markets coincide with market interest rates. Any deviation from this condition—measured by the so-called cross-currency basis—allows riskless profits for arbitrageurs that borrow at the low rate and lend at a higher rate with currency risk fully hedged, and therefore should not occur. In practice, of course, financial markets depend on small arbitrage opportunities as otherwise intermediaries have little incentive to borrow and lend in different market segments (Mehrling, 2015). Yet while deviations from CIP have been relatively small before the global financial crisis, more recently cross-currency bases have emerged as a structural feature of global dollar funding markets. Whereas dislocations driven by first the financial crisis and then the euro crisis are easy to explain, the endurance of cross-currency bases in the following years is more puzzling.

A key reason that has repeatedly been highlighted to explain the persistence of cross-currency bases is that regulatory requirements dampen the supply of global dollar liquidity: amidst growing demand for US dollars abroad, new regulations that impose limits on balance sheet arbitrage are effectively preventing global banks from lending freely into the FX swap market (Ivashina et al., 2015). Yet as leverage ratios are a constant, they cannot by themselves explain large cyclical fluctuations in cross-currency bases across different currencies. In addition, while leverage ratios certainly constrain some lending capacity, research shows that well-capitalised banks are better able to accommodate such restrictions (Brei et al., 2020). This suggests that the problem is not located in regulatory initiatives itself, but rather in the continued weakness of the banking sector (Admati & Hellwig, 2013).

Recent research from the BIS has identified exchange rate movements as an important additional variable in understanding fluctuations in cross-currency bases (e.g. Avdijev et al., 2019; Borio et al., 2016; Shin, 2016b). Foreign borrowers such as asset managers or corporate borrowers that acquire dollar assets in global markets likely have obligations in domestic currency, and thus tend to experience a currency mismatch in their global operations. To finance the purchase of dollar assets, these investors swap domestic currency into dollars in the FX swap market, thereby gaining access to dollar funding on a currency-hedged basis. For such borrowers, financial conditions loosen when their local currencies appreciate against the US dollar and their local currency...
positions appear stronger. As stronger balance sheet positions result in lower credit risks, dollar intermediaries such as banks tend to expand their lending activities to these borrowers. Local currency appreciation thus leads to greater risk-taking on the part of banks, and increased lending activity that narrows the cross-currency basis. Conversely, when the US dollar appreciates, borrowing conditions tighten and cross-currency bases widen (Bruno & Shin, 2015).\(^\text{17}\)

**Figure 6.6. US dollar index and the cross-currency basis**

Following Avdjiev et al. (2019), Figure 6.6. plots the US dollar broad index against a mean cross-currency basis spread.\(^\text{18}\) It shows the cross-currency basis as the mirror-image of the US dollar. This ‘financial channel’ of the exchange rate stands in stark contrast to the traditional trade channel: here, local currency depreciation is typically expected to boost export industries and thereby stimulate economic activity. Yet it also shows that monetary policy divergence in major economies can have a significant impact on FX swap markets. The strength of the US dollar from late-2014 onwards can be interpreted as a direct consequence of growing signals from the Fed that monetary tightening was imminent, creating expectations that US interest rates were to rise. About the same time, central banks in Europe and Japan were indicating that they were keeping interest rates low—the ECB only embarked on its own QE

\(^{17}\) Conversely, foreign investors that buy US dollars unhedged on the spot market experience losses when their local currency appreciates against the US dollar.

\(^{18}\) Data differs slightly from that used in Avdjiev et al. (2019). The US dollar index includes the Euro Area, Canada, Japan, United Kingdom, Australia, Switzerland, and Sweden; the mean cross-currency basis spread includes the same countries minus the last two.
programme in March 2015, and the Bank of Japan was about to begin new experiments with negative interest rates (January 2016) and yield curve control (September 2016). This divergence increased demand for short-term investments in the US, as interest rates there were now expected to be comparatively higher. As more funds flowed into the US, demand for US dollar funding rose, causing the currency to appreciate by over 20 percent between mid-2014 and late-2015, one of the sharpest rises in decades (Beckworth, 2016). The talking up of interest rate hikes thus contributed considerably to the widening of funding pressures in the FX swap market, as foreign investors reoriented their portfolio allocations towards the United States in the on-going search for yield.

The failure of CIP has policy implications that go beyond the scope of the present discussion. Most significantly, CIP violations put the idea of monetary policy independence itself into question: under the global financial cycle, small economies were meant to exercise monetary policy independently from the Fed’s interest rate choice because forward and spot exchange rates would adjust automatically to insulate domestic policy settings. Once CIP is violated, this claim no longer holds true, as domestic actors are able to borrow and lend synthetically in domestic currency at a rate that depends on Fed policy but sidesteps the domestic central banks’ policy settings (Cerutti et al., 2021). Yet while the effects of the global financial cycle are of key importance to smaller economies (Rey, 2015), Fed policy has long been characterised by a form of benign neglect towards its external consequences. As James Bullard from the St. Louis Fed emphasised following the 2013 taper tantrum, the Fed had a purely domestic mandate: ‘we’re not going to make policy based on emerging market volatility alone’ (cited in Tooze, 2018, p. 480).

In part, this lack of attention was due to the perceived peripheral role of the FX swap market for US monetary policy. While the FX swap market is an enormous market—reaching an estimated daily trading volume of $6.6 trillion in April 2019, with 88 percent of trades against the US dollar (BIS, 2019)—it typically only serves as a marginal source of dollar funding for globally active banks, which are usually able to access a variety of dollar-denominated wholesale funding instruments, including repo. On a structural basis, however, FX swaps constitute a significant source of funding for foreign non-bank investors. Since the global financial crisis, investors from low-interest rate jurisdictions have increasingly pushed into global markets in a cross-
border search for yield, often expanding their dollar investments and linkages to US financial markets (Shin & Turner, 2015). As I show below, and despite the Federal Reserve’s abdication of ‘global responsibility’ for dollar-denominated markets outside of the United States, movements in cross-currency bases can therefore be related to a host of domestic US reasons beyond interest rate policy—including regulatory changes, the Treasury’s cash management needs, and shifts in US monetary policy settings.

Figure 6.7 offers a snapshot of Euro and Yen bases plotted against OIS between 2014 and 2019. The initial widening of cross-currency bases in 2015 and 2016 coincided both with the Fed’s tightening and the introduction of the Basel III regime. For banks seeking to become Basel III compliant, reserve scarcity was not an issue at the time: as the Fed had just stopped QE3 at end-2014, bank reserve balances were at an all-time high. A bigger constraint were new leverage rules, as Basel III reclassified certain flighty institutional deposits as ‘non-operational’, requiring considerable holdings of HQLA to back them up. While pushing those deposits off their balance sheet would induce a reserve drain for banks, the more immediate effect was to ‘free up’ balance sheets and allow banks to deploy their HQLA portfolios to increase repo or FX swap lending instead. By early 2016, an estimated $400bn in non-operating deposits had left the banking system, with outflows accelerating after the Fed’s first interest rate hike in December 2015 (Pozsar, 2016d).19

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19 Banks can induce a deposit outflow by setting the interest earned on deposits to zero, thus incentivising investors to place their money elsewhere.
Investors rotating out of non-operating deposits had effectively two options to place their money: either by investing in money market fund shares, which in turn would place funds in the Fed’s RRP facility; or by investing in Treasury bills directly. As the Treasury was ramping up its TGA balance at the time, the increase in bill issuance pushed bill rates upwards and made investments in T-bills the more attractive option. From October 2015 to April 2016, the US Treasury built up about $300 billion in TGA balances. Adding to the bills supply was the move of foreign monetary authorities out of bills and non-operating deposits and into the Fed’s foreign repo pool. As private and foreign public non-operating deposit balances were invested in bills and the foreign repo pool, respectively, the associated increase in TGA and foreign repo pool saw bank reserves drop from $2.8 trillion by end 2014 to $2.4 trillion by mid-2015. While aiding the transition of the banking system to the Basel III regime, it also placed a first strain on the system’s intermediation capacity.  

Following the initial reshuffling of bank balance sheets, the dramatic widening of cross-currency bases in 2016 occurred due to money market fund reform in October 2016. The reform, implemented after a protracted political process (cf. Thiemann, 2018, pp. 210-216), effectively tightened the lending channel from money market

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20 During the 17-18 March 2015 FOMC meeting, SOMA Deputy Manager Laurie Logan explained that JPMorgan’s intention to push $100 billion in non-operating deposits off its balance sheet—most of which were held by foreign official accounts—coincided with the desire of foreign authorities to increase their investments in the foreign repo pool (FOMC, 2015, p. 13). These events likely contributed to the easing of investment restrictions on the foreign repo pool noted by Potter (2016).
funds to banks. Before the reform, the US MMF industry was divided into ‘prime’ and ‘government’ funds. Prime MMFs played an important role in funding both domestic and foreign banks by purchasing Certificates of Deposit or Commercial Paper and providing funding in the GC repo market. By contrast, government MMFs specialise in Treasury and agency paper and tend to provide financing to US government agencies and primary dealers (Baba et al., 2009). The reform of the industry essentially converted prime MMFs into government MMFs, leading to a shrinkage of prime funds’ assets by $1.3 trillion, of which $550 billion had been used to fund foreign banks (Aldasoro et al., 2017).

**Figure 6.8. Money market fund reform ($ trillion)**

Fed officials considered the reform a success, precisely because prime MMFs had been a source of instability during the global financial crisis. As Eric Rosengren of the Federal Reserve Bank of Boston stated in the November 2016 FOMC (2016c, pp. 102-103) meeting,

> The recent trillion-dollar movement out of prime money market funds into government only money market funds represents a relatively rare instance in which we have been successful in intentionally reducing risk in the shadow banking system. […] A very substantial movement into government funds as a result of regulatory changes to prime money market funds should give us some hope that, with sufficient perseverance, we will be able to identify other significant areas of instability in the shadow banking system, discuss them publicly, and get them changed.

Yet far from diminishing shadow banking practices, the reorganisation of the MMF industry pushed banks more closely into secured lending markets. As foreign banks’
access to cheap sources of unsecured funding in wholesale money markets was now drastically reduced, they primarily responded by increasing their reliance on the FX swap and repo market, most notably via their broker-dealer subsidiaries (Correa et al., 2020). Dealers typically arbitrage repo rates by borrowing from MMFs at the triparty repo rate and lend at the bilateral repo rate to non-dealer investors such as hedge funds. Due to institutional characteristics and trading relationships, repo intermediation chains are often highly complex and opaque. For instance, studies have shown that French repo dealers play a significant function in intermediating between MMFs and the broker-dealer arms of Japanese banks (Aldasoro et al., 2019; R. M. Smith, 2016). In the wake of the MMF reforms, these funding chains have in part been reoriented towards FX swap lending (Pozsar, 2017a).

Overall, by reducing access to unsecured wholesale funding, MMF reform tightened lending channels especially for foreign banks and pushed money market intermediation closer into the secured market via the dealer branches of banks. Yet as dealer-banks balance their repo and FX swap lending amidst regulatory restrictions on their lending capacity, global dollar funding has become more expensive (Aldasoro et al., 2017). The impact of the MMF reform is clearly visible in the widening of cross-currency bases during 2016, with money flows driven both in anticipation of the rule change and its eventual implementation. The widening of the base to over 100 basis points against OIS in 2016 both points to persistent profit opportunities for banks, but also indicates that banks only were constrained in their ability to exploit such arbitrage opportunities by digging into their HQLA portfolios. The widening of the cross-currency base, in effect, reflects ‘the shadow price of bank balance sheet capacity’ (Shin, 2016a, p. 12) as intermediation costs rise.

Cross-currency basis spreads started to narrow again throughout 2017. We can identify two specific reasons for this trend. First, wide bases in 2016 increased the attractiveness for new actors to lend. Pozsar (2016a) shows that certain large asset managers lend via dealers directly into the FX swap market. While lending in the FX swap market offers better yield than the repo market, running an FX swap loan book is typically limited to a small number of institutional investors of significant size and complexity. Certain public portfolio managers such as foreign central banks have also become active lenders in the FX swap market. While most central banks do not disclose the composition of the FX reserves, the Reserve Bank of Australia (RBA)
provides an unusually detailed breakdown of their portfolio management and investment choices, offering a unique window into such activities. Taking advantage of FX swap-implied yields on short-dated Japanese investments, the RBA has engaged in large-scale swap operations of Australian dollars against yen. For the same reason, the RBA also swaps other currencies from its foreign exchange reserves portfolio against yen to enhance returns (e.g. Reserve Bank of Australia, 2019, pp. 55-59).\textsuperscript{21}

The second reason for the easing of FX swap funding conditions was that throughout 2017, the Treasury started to run down its TGA balances. Between January and March 2017, the Treasury reduced the balance by $350 billion, and TGA balances continued to fluctuate between $200bn and $70bn for the rest of the year. By adding reserves to the banking system, the reduction in TGA balance eased bank balance sheet constraints and allowed additional lending in the FX swap market. As a result of these activities, supply and demand for FX swaps became better aligned and bases started to tighten, although fluctuations in cross-currency bases persisted in the following years, especially around year-end turns.

Funding pressures in the FX swap market offered a first indication of the complex interplay of monetary, fiscal, and financial stability policies. While the introduction of Basel III and the subsequent US money market fund reform account for a sizeable widening of the cross-currency basis, the Fed’s interest rate and balance sheet policies as well as the Treasury’s cash management practices exerted a noticeable effect on offshore funding conditions. While Fed officials considered these effects marginal and primarily outside of their purview, the tight integration of dollar funding markets meant that funding pressures could quickly migrate elsewhere as money market conditions and policy decisions changed. As I show below, between 2017 and 2018, these funding pressures started to bleed through to the unsecured LIBOR market.

\textbf{6.2.2. Funding strains in the LIBOR market}

The London Interbank Offered Rate (LIBOR) is the interest rate at which large banks can borrow from one another on an unsecured basis in Eurodollar markets. It is used as a benchmark rate for an estimated $400 trillion in financial products financial

\textsuperscript{21} The increased share of yen in the RBAs reserve portfolio thus should not be seen as indicating a strengthening of the yen as global reserve currency, but rather masks synthetic global dollar funding.
instruments such as derivatives, loans, bonds, investment products, and others, meaning that interest payments of consumers and businesses on these products adjusts based on movements in LIBOR. Due to the significance of LIBOR, investors typically rely on the difference between LIBOR and risk-free interest rates as a gauge of stress in the banking system. As Figure 6.9. shows, the spread between 3-month LIBOR and the US overnight indexed spread (OIS) is typically low but increased dramatically during the global financial crisis and fluctuated again during the euro crisis. Since 2016, swings in LIBOR-OIS spreads have reappeared, similar to the widening of cross-currency bases at the same time.

*Figure 6.9. LIBOR-OIS spread (in percent)*

Following a series of manipulations of LIBOR rates by major banks, recent years have seen considerable momentum for transitioning away from LIBOR benchmarks (see Schrimpf & Sushko, 2019). As LIBOR was determined not on the basis of actual transactions between banks but rather on a poll of a small group of major banks, each of which provided a judgement-based estimate of borrowing rates, these banks could easily influence LIBOR rates either to make themselves appear more creditworthy or to move markets in a specific direction (Duffie & Stein, 2015). To protect against such manipulation, reforms seek to ground benchmark rates in actual transactions. The significant decline in activity in interbank deposit markets after the global financial crisis was a contributing factor.

22 The LIBOR-OIS spread indicates the difference in funding costs between 3-months unsecured borrowing in the London wholesale money market and borrowing using an Overnight Indexed Swap, an interest swap whose floating leg is linked to a public index of daily overnight rates (in the United States, this is the Fed funds rate). Thus, the LIBOR-OIS spread indicates the premium that banks pay when borrowing funds for a pre-determined period relative to the expected interest cost from repeatedly rolling over funding in the overnight market. In times of market stress, uncertainty about liquidity and counterparty credit risk creates an opportunity cost of term funding, resulting in a positive spread between LIBOR and OIS rates.
crisis—first due to the prevalence of excess reserves following QE, and later due to the Basel III HQLA requirements—has complicated such efforts. In recent years, unsecured instruments like Commercial Paper and Certificates of Deposit, held by non-banks such as MMFs, have come to constitute the most important unsecured wholesale source of funding for banks (Eren et al., 2020b). In acknowledgement of this shift in bank funding sources, recent LIBOR rates are derived primarily from funding costs of CP/CD and other related market inputs via the so-called waterfall methodology (cf. ICE, 2018).

Due to the shift away from interbank deposits, whether FX swaps are funded in unsecured CP/CD markets by foreign banks or in repo markets by dealers can have a significant impact on LIBOR rates. Figure 6.10. offers a snapshot of LIBOR-OIS spreads in recent years. The funding strains on CP/CD in the wake of the 2016 MMF reform are clearly visible. In turn, the easing of LIBOR rates in early 2017 can be attributed to the diminished role of CP/CD as active funding markets as foreign banks were reorienting their funding strategies away from unsecured wholesale sources and towards the repo market via their dealer branches.

Figure 6.10. Recent movements in LIBOR-OIS spreads

A curious outcome of the substitutability of CP/CD and repo funding sources was that the US Treasury has come to play a key role in influencing whether LIBOR is an active funding market or not. Throughout early 2017, the funding advantage of dealers in the repo market was directly derived from the low balances in the Treasury General Account. As previously stated, in the context of low TGA balances and associated low bill issuance, MMFs, asset managers and other institutional cash pools tend to invest
directly in the repo market. Once bill supply increases with the ramp-up of TGA balances, the price of bills falls, and yields pick up. Given the heightened availability and attractiveness of bills, asset managers then tend to buy bills outright, forcing dealers to raise repo rates to attract funding. An increase in repo financing costs, in turn, turns LIBOR into an active funding market again as bill rates effectively lift the floor under both CP/CD and repo rates (Pozsar, 2017a).

Yet the Treasury was able to influence LIBOR in other ways than simply through its cash management. As Figure 6.10. shows, in late 2017 and early 2018, LIBOR rates surged considerably. The reason for this can be found in US tax reform. In late 2017, the US Congress passed what is commonly known as the Tax Cuts and Jobs Act (TCJA), signed into law by President Trump on the of December 22. The TCJA was a comprehensive change of US income tax that included a cut in the corporate income tax rate from 30 percent to 21 percent. More significantly, the TCJA included major changes in the taxation of foreign profit. Before the TCJA, foreign profits of US multinational enterprises (MNEs) were subject to additional US tax once these profits were repatriated into the US. The system of double taxation upon repatriation incentivised US MNEs to keep profits offshore. Under the TCJA, the US shifted from this ‘worldwide’ to a ‘quasi-territorial’ tax system in which profits are only taxed in the jurisdictions where they were earned. As a result, foreign profits were no longer subject to US taxes when repatriated. To aid the transition to the new tax regime, the TCJA imposed a one-time tax (payable over eight years) on the existing stock of offshore holdings regardless of whether they were repatriated or not—thus eliminating the tax incentive to keep cash abroad (Gravelle & Marples, 2019; Smolyansky et al., 2019).

The move to a quasi-territorial tax system marked an inflection point in the accumulation of foreign bond portfolios. Offshore cash balances had been accumulating since the last major tax holiday in 2004 (cf. Dharmapala et al., 2011), and over time these cash balances had been invested first in US Treasury bond holdings, and later, as portfolios grew, into corporate bonds, asset backed securities, bank term debt and other riskier investments (Pozsar, 2018c). By 2017, these offshore bond holdings had become sizeable: as Figure 6.11. shows, only Citibank had a larger portfolio of US Treasury securities than Microsoft, whereas Apple’s holdings were on a par with Bank of America and JPMorgan’s. In terms of credit portfolios, Apple’s
holdings were rivalling both Citibank and JPMorgan. In total, US MNEs had accumulated approximately $1 trillion in liquid assets abroad.\textsuperscript{23}

**Figure 6.11. Corporate vs. bank portfolios**

Balance of payment data shows that during 2018, US MNEs repatriated $777 billion, or roughly 78 percent of their offshore bond portfolios (Smolyansky et al., 2019). The significance of repatriation however does not come from the shift of portfolios from offshore affiliates to their parent companies. Repatriated profits were generally used for four different purposes: mergers and acquisitions, dividend payments, share

\textsuperscript{23} The estimate is calculated by Federal Reserve staff based on Bloomberg data for nonfinancial S&P 500 firms and covers cash and cash equivalents while excluding overseas profits that are permanently reinvested in companies’ overseas operations (Smolyansky et al., 2019).
buybacks, or debt buybacks. Each of these uses required not bond portfolios, but cash (Pozsar, 2018c).

The liquidation of bond portfolios is where tax reform meets money market funding. Corporates can either liquidate their portfolios by selling assets or by letting them roll off. The unwinding of corporate Treasury bond portfolios shifted funding patterns in money markets in significant ways. Previously captive buyers of US Treasuries, the liquidation of bond portfolios turned corporates into active sellers of Treasury securities, adding to the supply of collateral. The tax reform was thus compounding the effect of the Fed’s taper, which had commenced in late 2017. The sudden absence of corporate buyers was felt not just in the US Treasury market, but also in the market for corporate and bank debt, putting pressure on both investment grade corporate bond and bank funding markets. To compensate for the loss of corporate purchases, banks began to issue more debt of various maturities, mixing 5-year debt with three-month funding. The resulting increase in 3-month CP/CD issuance, in turn, put pressure on LIBOR rates (Pozsar, 2018b, p. 4).

Aggravating bank funding strains was the increase in TGA balances. Following the resolution of the debt ceiling in February 2018, the Treasury proceeded to ramp up its cash balances in the TGA. The associated $400 billion in bills issued pushed three-month bill rates upwards, and once again pushed the floor under all short-term money market rates higher by a similar amount. As the funding needs of the Treasury coincided with the liquidation of corporates’ portfolios, banks found themselves directly competing with the Treasury for funding. In this context, the surge in bills started to crowd out CP/CD funding, forcing banks to compete harder for funds and pushing LIBOR rates upwards (Pozsar, 2018b, p. 5).

In summary, from late 2017 onwards the growing role of offshore asset and reserve managers in providing FX swap funding put strains on LIBOR rates as these actors were tapping unsecured sources of dollar funding for their FX swap lending operations. Funding pressures were exacerbated by tax reform that effectively removed cash-rich offshore corporate buyers of sovereign, corporate and bank debt. The disappearance of $1 trillion of corporate offshore bond portfolios and their associated bid for funding complicated both Treasury debt management and bank funding, and increased competition between these two for funding sources. As I
discuss below, the absence of the offshore corporate bid added further to growing pressures on collateral markets in 2018 and 2019.

6.2.3. Funding strains in the US repo market

From late 2018 onwards, funding pressures migrated from the offshore market segments—the FX swap and LIBOR markets—towards US repo markets. The emergence of strains in repo markets was driven by an interplay of both domestic and global factors. While the next section will discuss domestic factors, this section takes the global perspective. The pivotal event that shifted funding pressures onto domestic markets was the relative disappearance of foreign demand for FX swaps as the US Treasury yield curve inverted. The diminished presence of end-buyers left US primary dealers with growing Treasury inventories that required financing in the repo market.

Throughout the 2010s, private foreign demand for US dollar assets had grown steadily due to the search for yield from non-bank investors from low-yield jurisdictions, notably from East Asia and Europe (BIS, 2020b; IMF, 2019). The growth of private foreign investment—both hedged and unhedged—in US debt has increased the presence of price-sensitive marginal buyers of US sovereign debt. Previously, global buyers such as central banks would accumulate reserves on an unhedged basis and accept the implicit fiscal costs of changes in yields and exchange rates as part of their macroeconomic management strategies. By contrast, private investments that are driven by profit and loss considerations are not just flighty in times of crisis—they are also sensitive to shifts in expected return.

As previously mentioned, when funding in the FX swap market, investors generally pay an FX premium over other funding rates. As explained by Pozsar (2019c), the borrowing costs of foreign investors can be broken down into a combination of three distinct dollar funding market components: first, the cost of US dollar OIS or the risk-free rate of interest; second, the Libor-OIS spread investors pay when funding in offshore markets; and third, the cross-currency basis spread that measures the cost differential between funding unsecured at Libor rates and funding secured via FX swaps. The combination of these three rates determines the profitability of dollar funding strategies.
Figure 6.12. Breakdown of FX-swap implied funding costs (in percent)

Figure 6.12. offers a breakdown of these costs from the perspective of Japanese investors. During the first half of the decade, the cross-currency basis was the dominating component of hedging costs. The cross-currency basis had been widening for most currencies since the beginning of 2015, indicating increased borrowing costs for foreign investors. The widening of cross-currency bases is symptomatic of global dollar funding markets in which the demand for dollars via FX swaps outpaces the supply of dollars, and the ability of arbitrageurs such as global banks to raise dollars in other markets to bridge the imbalance is limited for the reasons explored above. To the extent that banks tap unsecured markets to arbitrage imbalances in the FX swap market, widening cross-currency bases routinely put pressure on Libor rates as well.

Considering the added hedging cost of foreign currency investments, the profitability of Asian investors hinged on an upward sloping US yield curve, as the profitability of borrowing (hedging) short and lending (investing) long depends on the existence of a term premium. In this context, foreign investment depends on the overall ease of financing conditions in global markets, which depends both on overall economic conditions and the monetary policy settings in core economies. Here, the Fed’s interest rate hikes had a profound impact on hedging costs.

Until 2015, a steep US Treasury yield curve attracted significant foreign investment. The situation changed dramatically in 2017 with the acceleration of the Fed’s interest rate hikes. Between 2017 and 2019, the Fed hiked interest rates eight times by a
cumulative 200 basis points, which wiped out the Treasury yield curve—by the end of 2018, the Treasury curve had become the flattest globally. Driven by expectations of weaker economic activity amidst the accelerating US-China trade war, in mid-2019 anticipations of monetary easing helped push long-term yields below current short-term rates—the so-called inversion of the yield curve. In light of high foreign demand for long-term securities, the inversion was heightened by compressed term premia (Aramonte & Xia, 2019). On a hedged basis, it is likely that the Treasury yield curve was already inverted by late 2018 (Pozsar, 2019c).

Figure 6.13 shows the inversion of the yield curve on an unhedged and on a hedged basis. The conventional measure of inversion—the spread between 10-year Treasury bonds and 3-month Treasury bills—shows that the yield curve inverted in May 2019. By contrast, when calculating the spread between 10-year Treasury bonds and the FX-swap implied funding premium, the curve already inverted in October 2018 both for euro and yen. In response to these developments, foreign investors in particular from East Asia have increasingly pushed into riskier investments—either by purchasing unhedged, or by going down the credit and liquidity spectrum with investments in riskier corporate assets and Collateralised Loan Obligations (Fujikawa, 2020).

**Figure 6.13. FX-swap implied inversion of 10-year US Treasury bonds (in percent)**

![Graph showing FX-swap implied inversion of 10-year US Treasury bonds (in percent)](image)
The reduction of the ‘foreign bid’ for Treasury securities was compounded by the effect of the TCJA on overseas corporate bond portfolios, which until early 2018 had also absorbed a significant amount of US Treasury securities. Along with growing Treasury debt issuance following the tax cuts and the on-going taper of the Fed’s balance sheet, the sudden reduction in end-buyers for US Treasury securities led to a noticeable increase in primary dealer inventories. Figure 6.14. shows the impact of the FX-implied inversion in October 2018: inventories of US Treasury securities and agency MBS almost doubled from $150 billion to $290 billion between October 2018 and January 2019.

*Figure 6.14. Primary dealer inventories ($ billion)*

Without captive end-buyers, primary dealers were forced to finance their inventories in the repo market. As the added repo demand pushed repo rates higher, banks have become opportunistic lenders in the repo market. Until end-2017, banks were primarily drawing on their HQLA buffers to finance term FX swap lending and arbitrage negative cross-currency basis spreads. Starting in 2018, however, banks increasingly pivoted towards repo lending to arbitrage the spread between overnight GC repo rates and IOER. The growth of dealer inventories thus affected not just a shift in funding pressures between market segments, but also between maturity segments: whereas carry traders such as FX-hedged foreign investors or domestic hedge funds typically acquire Treasury bonds on a term basis, primary dealers were forced to
refinance their inventories on a daily basis via overnight repos (Copeland et al., 2021; Correa et al., 2020; Pozsar, 2019c).

The shift to repo financing created a distinct feedback effect between the Fed’s two policy normalisation mechanisms—interest rate hikes and balance sheet taper: as interest rate hikes were driving the inversion of the yield curve and the associated accumulation of primary dealer inventories, the resulting repo funding needs placed ever-growing balance sheet demands on American banks. Yet amidst the Fed’s ongoing balance sheet taper, by end-2018 banks found their capacity to tap their HQLA portfolios to lend in the repo market increasingly constrained. In this context, the Fed’s capacity to taper could not be disentangled from the overall US Treasury yield curve, and the attractiveness of Treasury bonds for marginal buyers.

The dramatic growth of primary dealer inventories was exacerbated by the increase in US Treasury financing needs. While the issuance of coupons added to the general pressure on inventories and associated repo financing needs, large balances in the TGA flooded the market with bills that were pushing up repo rates. As Figure 6.15. shows, throughout 2018 and 2019 bill rates were increasingly pushing repo rates outside of the Fed’s target range as indicated by IOER and RRP. Compounding this effect were large investments by foreign central banks in the foreign repo pool, which effectively diverted foreign official investments from the bill markets and onto the Fed’s balance sheet itself: at this point, the Fed was losing control not just over financing conditions, but over key short-term interest rates, putting the mechanisms of taper into question.
In financial stability terms, the developments discussed above placed increasing strain on repo rates, as visible in the reappearance of quarter-end and year-end repo funding spikes. Repo spikes had first occurred in 2015 and 2016 due to the uneven implementation of Basel III: differences in the calculation of leverage ratios—daily in the US, quarterly in Europe—had allowed certain foreign banks to expand their balance sheets more proactively during their daily operations. At quarter-ends, however, foreign banks had to scale back their dollar lending in the repo market on quarter-ends in order to meet their leverage ratio requirements. Such ‘window dressing’ behaviour by foreign banks has contributed to higher volatility of repo transaction volumes and the appearance of spikes in domestic US repo funding rates at quarter ends (Afonso et al., 2020; Correa et al., 2020). Yet as the Fed’s and Treasury’s money market practices put a combined squeeze on bank intermediation capacity, in 2018 and 2019 these spikes would increase in intensity. As funding strains migrated into the core of US secured money markets, the lack of coordination between the Fed and the Treasury thus became increasingly difficult to ignore.
6.3. The September 2019 repo spike

Taking a global perspective, the previous section has shown how funding pressures migrated from the outer reaches of the offshore dollar money markets (the FX swap market) to LIBOR and ultimately the US repo markets. Amidst a variety of factors for these developments, two stand out: first, the Fed’s policy normalisation process contributed to the inversion of the FX-hedged yield curve by late 2018, effectively pushing foreign buyers away from US investments; and second, the US Treasury’s tax reform allowed US corporates to repatriate funds from their offshore bond portfolios. Taken together, the disappearance of the offshore dollar bid led to the growth of primary dealer inventories of US Treasuries that were now increasingly financed on the margin in the overnight US repo market. By lowering the corporate tax rate, the Trump administration’s tax reform further lowered tax income for the US government, leading to increased issuance of Treasury debt into an already saturated and elasticity-constrained market.

This section details the domestic factors that contributed to US repo market volatility, resulting in the September 2019 repo spike that saw repo rates soar to ten percent. I identify three key factors: (i) diminished bank reserve positions and increased bank liquidity requirements; (ii) the growth of the sponsored repo market that connected money market funds with hedge funds; and (iii) the overall funding strategy of the US Treasury. I conclude by discussing the Fed’s policy response.

6.3.1. Bank reserve positions and the search for intraday liquidity

In early 2019, reserve positions in the US banking system stood at $1.5 trillion, down from a high of $2.8 trillion after the end of QE3 in late 2014. Based on a Fed survey of the banking industry between September 2018 and February 2019, private banks estimated the system’s demand for reserves at $800 billion to $900 billion, well below the level available at the time. Given large fluctuations in reserve balances—for instance, it was not unprecedented to see a rapid build-up of the TGA balance drain $100 billion reserves within a few days—Fed officials acknowledged the need to operate in an ample reserves environment, and maintain a reserve ‘buffer’ beyond the system’s minimum requirements. In any case, at the time the Fed was certain that reserve balances within the system remained indeed ample (Logan, 2019).
The precise need for reserves is difficult to estimate not just because of fluctuations of reserve positions, but also because reserves are distributed unevenly across the banking system. By mid-2018, the four largest banks—JPMorgan, Bank of America, Citibank, and Wells Fargo—collectively held 29 percent of all reserves within the banking system, with JPMorgan accounting for about 14 percent of all total reserves. A year later, in mid-2019, their reserve positions had dropped to 25 percent, driven in particular by a spectacular reduction of JPMorgan’s reserves: between the end of the second quarter 2018 and the second quarter 2019 JPMorgan reduced its reserve holdings by $157 billion. The draining of reserves was driven by the deployment of HQLA portfolios in the repo market as increased bills issuance had pushed repo rates above IOER. In fact, this was a development that was incentivised by the Fed itself: through repeated 5 basis point cuts to the interest on reserves rate, the Fed was effectively trying to get banks to lend into the repo market and drain reserves from their portfolios. The idea behind this move was to flatten the distribution of reserves across the banking system (Pozsar, 2019d). Concurrent with this vision of pushing banks into the repo market, the HQLA portfolios of the top-four banks thus became increasingly skewed towards US Treasuries (Figure 6.16).

Figure 6.16. Bank HQLA Portfolios ($ billion)
The shift from ‘excess’ reserves that can be readily deployed in the repo market to Treasury securities was not the only factor limiting bank lending capacity. As previously discussed, the Basel III Liquidity Coverage Ratio requires banks to hold high quality liquid assets—such as reserves or Treasuries—to prefund 30-days’ worth of net cash outflows. Importantly, LCRs are based on end-of-day balance sheet snapshots, leaving banks free to expand and contract their balance sheet positions during the day as cash flows settle on their accounts. Domestic macroprudential regulation, however, imposes additional requirements on intra-day liquidity needs, forcing banks to further optimise their payment flows. Relevant domestic regulations include CLAR stress tests, Regulation YY, as well as failure planning requirements for Resolution Liquidity Adequacy and Positioning (RLAP) mandated by the Dodd-Frank Act. The latter requires banks to draw up ‘living wills’ that describe the bank’s strategy for rapid and orderly resolution in the event that financial distress leads to failure of the bank, most importantly by ensuring that liquidity is available to meet any deficit at any time (Copeland et al., 2021).

By 2019, the phasing in of resolution planning needs and the reduction of bank reserve positions made intraday liquidity needs an increasingly binding constraint on bank operations. RLAP seeks to protect banks’ LCR in a resolution setting: as banks would previously worry only about their end-of-day metrics, it was typical to see cash outflows in the morning that were matched by cash inflows in the afternoon. From the perspective of resolution liquidity, however, if a bank were to collapse at noon, those afternoon inflows would no longer be forthcoming, and the bank would end up short in its liquidity position and in breach of its regulatory requirements. Unlike Treasury bonds or other highly liquid assets, the only instrument that truly promises immediate, intra-day liquidity is central bank reserves: the only way that banks can become RLAP compliant is to pre-fund their operations by holding more reserves at the Fed.

Pozsar (2019a) outlines how RLAP impacts the intraday incentives for dealer banks on days of Treasury issuances. Due to a requirement that the Treasury is paid early in the morning, reserve balances are converted into TGA balances early in the day, reducing the supply of reserves available that day for any purpose. This creates

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24 The Fed’s Large Institution Supervision Coordinating Committee (LISCC) supervises intraday liquidity risks of large banks and conducts Comprehensive Liquidity Analysis and Review (CLAR) stress tests. The Fed’s Regulation YY, Enhanced Prudential Standards, includes additional rules covering intraday liquidity exposures.
intraday liquidity shortages for primary dealers that underwrite newly issued Treasuries in the morning and distribute them to various types of buyers in the afternoon. Dealers typically pre-fund these flows via overdrafts at their clearing bank, which they in turn pay off by tapping reserve-rich banks that can swap reserves for repo. But sometimes reserve-rich banks cannot lend because they hit their regulatory intraday liquidity limits.25

The combination of the Fed’s balance sheet taper, increased Treasury debt issuance, and binding intraday liquidity constraints thus tightens the capacity of large US banks such as JPMorgan to act as elastic private sector backstop or lender of second-to-last resort. As one bank treasurer remarked on the conflicting goals between the Fed’s operational and regulatory arms, ‘[t]he markets folks in New York … want us to lend our reserves, and the regulatory folks in D.C. are incentivizing us to top up and hold on to our reserves’ (cited in Pozsar, 2018a, p. 4).

6.3.2. The growth of sponsored repo

The second significant development that has shaped US repo markets is the rapid growth of the FICC sponsored repo programme. The programme allows well-capitalised FICC members to sponsor other institutions—such as MMFs or hedge funds—to access the interdealer repo market. The programme started in 2005 but remained small until 2017. Prior to a regulatory change in 2017, sponsored entities could only lend cash in the interdealer market; the change in regulation allowed these entities to both lend and borrow cash. The programme was further expanded in April 2019, when the base of sponsoring dealers was broadened beyond custodial banks (Afonso et al., 2020).

The sponsored repo programme is an important innovation in repo markets that effectively ‘flattens’ the hierarchical relationship between distinct repo market participants. Before sponsored repo, cash-rich institutions such as MMFs or asset managers could only lend to dealers at the triparty repo rate or the uncleared GC repo rate, respectively. They did not have access to centrally cleared repo that was the

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25 As Pozsar (2019a) shows, in such cases clearing banks access funding from FHLBs in the Fed funds market, creating spillovers between tighter repo funding markets and Fed funds, with adverse effects on the Federal Reserve’s control over its target-rate.
preserve of FICC members, such as custodian and trust banks. Dealers in turn were seeking to lend at higher rates in the GC repo market—either at the FICC-cleared interdealer rate, or at the uncleared GC repo rate to non-FICC members such as hedge funds. Dealer profit is derived from the intermediation-spread between its funding and lending rates. Sponsored repo reduces these intermediation spreads by allowing MMFs and asset managers (on the lending side) and hedge funds (on the borrowing side) to access FICC-cleared repo rates, thus making dealer funding more expensive and dealer lending less profitable.

While the growth of sponsored repo thus goes against the profit interests of broker-dealers, it was driven by large clearing banks—the Bank of New York Mellon, State Street Bank, and JPMorgan (Pozsar, 2019b, p. 19). The advantage of sponsored repo for these banks is that by borrowing and lending to (sponsored) FICC members, they are running a matched repo book that becomes nettable. For regulatory purposes, if a dealer borrows and lends through repos that have the same maturity and counterparty, these trades can be netted and are thus balance sheet neutral. By expanding access to FICC and allowing non-dealers to interact in the FICC-cleared repo market, the sponsored repo programme makes balance sheet netting possible even for trades with non-dealer counterparties. The advantage of the sponsored repo programme is thus precisely that it circumvents the regulatory restrictions that have prompted some dealers to retreat from repo-lending during quarter-ends, and that have contributed to volatility in the repo market. In theory, the sponsored repo programme would reduce the costs of repo intermediation and smooth market functioning (Afonso et al., 2020).

Participation in the sponsored repo programme grew rapidly. Based on data from the Office of Financial Research, MMF investments in sponsored repo increased from $35 billion by end-2017 to $204 billion by mid-2019, or 19 percent of total MMF repo lending. From early August 2019, however, MMF sponsored repo lending started to decrease as MMFs shifted their portfolios into term instruments such as Treasury bills in light of an anticipated interest rate cut by the Federal Reserve. On the other side of sponsored repo trades were relative value hedge funds that were engaged in leveraged bets on the expected future path of the federal funds rate. Throughout 2019, these hedge funds effectively took over the position from foreign institutional investors as marginal buyers of US Treasury debt, as they were seeking to maximise bets on a Fed rate cut in response to the inversion of the yield curve (Avalos et al., 2019). According
to a survey by the Bank of England, between October 2018 and April 2019 global hedge funds’ repo borrowing grew by over 40 percent to around $1 trillion, much of which was US dollar repo. The large increase in borrowing has been ascribed to the growth of the sponsored repo programme (BIS, 2020b, p. 28).

6.3.3. The Treasury’s funding strategy and the September 2019 repo spike

Following the December 2017 Tax Cuts and Jobs Act, the US federal budget deficit had widened on a steady basis, leading to increased US Treasury debt issuances. In September 2019, two factors compounded the effect of the US Treasury on money markets. First, following the suspension of the debt ceiling in early August 2019, the Treasury set out to rebuild its TGA balances. Between mid-August and mid-September, increases in TGA balances drained more than $120 billion of reserves from the banking system, and half of this amount in the last week of that period alone (Afonso et al., 2020). Second, the conversion of reserves into TGA balances was exacerbated on the September 16 by quarterly corporate tax payments due that day, and by an issuance of $54 billion in Treasury securities, which was settled early in the morning. While not an unusually large settlement, it occurred at a time of low reserve balances held at the Fed by repo-active banks and tightened balance sheet space for further lending (Copeland et al., 2021, p. 10).

The payment of corporate taxes affected repo market activity by reducing MMF assets, as many corporate entities hold cash in the form of MMF shares. During the week of the September 13-16, assets under management of MMFs decreased by $34 billion as investors were withdrawing funds to settle their tax obligations. Repo lending by MMFs contracted by $43 billion in the week of the 16th, and by $31 billion in the following week. The retrenchment of MMF funding increased intermediation costs faced by broker-dealers, as the demand for repo funding was highly inelastic, with hedge funds seeking to maintain arbitrage trades between cash bonds and derivatives. Contraction of MMF repo lending was especially pronounced in the sponsored repo market, which relies less on established business relationships than the triparty repo market (Afonso et al., 2020, pp. 19-20). Given the sudden contraction of MMF lending, on September 17 overnight GC repo rates spiked to a high of 10 percent and settled at 5.25-3.15 percent above the IOER rate (Correa et al., 2020, p. 31). Triparty
repo rates were also elevated, as market participants were likely observing disruptions in other repo markets and started to demand higher bids (Afonso et al., 2020).

As Figure 6.17. shows, repo market volatility on September 16-17 far exceeded that seen on other days. During most of 2015-2017, GC repo rates traded below IOER due to large reserve balances and a low amount of outstanding Treasury bills. From 2018 onwards, increased bills supply caused by the widening deficit, along with the reduction in reserve positions induced by the Fed’s balance sheet taper increasingly pushed repo rates above IOER. Incentivised by the Fed through small IOER cuts, large banks had taken advantage of elevated repo rates during 2018 by running down the reserves portion of their HQLA portfolio. By 2019, this flattening of reserve distribution across the banking sector had the adverse effect of that hoped for by the Federal Reserve: instead of broadening repo lending capacity, low aggregate reserve positions increasingly restricted bank lending. In September, the US Treasury’s TGA increase, corporate tax payments, and the associated withdrawal of MMF repo funding in the sponsored repo market created a perfect storm that banks were no longer able to elastically backstop.

Figure 6.17. Repo funding spreads (in percent)

The acute funding shortage prompted the Federal Reserve to reinstate its repo lending facility that had been inactive since the global financial crisis. On September 17, the Fed established a facility with up to $75 billion in drawing capacity. After the first lending operation failed due to ‘technical issues’, on a second effort large banks—via their primary dealer branches—tapped the facility for $53 billion against Treasury and
agency MBS collateral. The announcement of the facility itself succeeded in calming money market stress, and throughout year-end 2019 and into early 2020 the Fed carried out daily overnight and term repo auctions. Take-up of the facility peaked at $120 billion on December 31. On the October 11, the FOMC further instructed the Fed to purchase Treasury bills at least into the second quarter of 2020 in order to maintain a supply of reserves at levels that had prevailed in early September (Afonso et al., 2020; Anbil et al., 2020; Correa et al., 2020).

Following the events of mid-September, Federal Reserve officials questioned the role of banks during the repo spike episode. Speaking to the Financial Times, Laurie Logan, now Senior Vice-President at the New York Fed, pointed to the concentration of reserves at a small group of banks as a potential problem (Rennison & Greeley, 2019). Yet as this chapter has shown, her interpretation fails to understand the nature of the problem: for some bank (such as JPMorgan) to function as the private backstop to the payments system, it would require a sizeable buffer of reserve balances on its book. In fact, the Fed’s repeated efforts at redistributing reserves via a set of small IOER cuts from 2018 onwards had exacerbated the problem: by incentivising JPMorgan to lend in the repo market, the Fed had contributed to the reduction of the excess reserve balances needed to lend freely in markets during periods of volatility. When asked about the September repo episode in JPMorgan’s 2019 third quarter earnings call, JPMorgan Chairman and CEO Jamie Dimon responded that

Last year [2018] we had more cash than we needed for regulatory requirements. So when repo rates went up, we went from the checking account, which was paying IOR into repo. Obviously makes sense, you make more money. But now the cash in the account, which is still huge. It’s $120 billion in the morning and goes down to $60 billion during the course of the day and back to $120 billion at the end of the day. That cash, we believe, is required under resolution and recovery and liquidity stress testing. And therefore, we could not redeploy it into [the] repo market, which we would have been happy to do. (cited in Copeland et al., 2021, p. 16)

For Jamie Dimon, of course, it is easy to pin the blame on the new regulatory environment. Yet while his statement is factually correct, it misses the broader point: instead of locating an inherent problem of over-regulation in the macroprudential regulatory regime, the events of the September 2019 repo spike are more productively related to the policy mistakes of the Federal Reserve as described in this chapter. Whereas regulatory reforms present an external framework for market functioning, the central bank and the Treasury are market actors in their own right, capable of
influencing the viability of lending and investment strategies through their positioning within the webs of the payments system. Due to a lack of coordination between these actors and a strong bias towards financial tightening on the part of the Federal Reserve, the monetary policy incentives set by the ‘market folks in New York’ increasingly clashed with the broader demands set by the ‘regulatory folks in D.C.’.

6.4. Conclusion

This chapter has analysed the failure of the Federal Reserve’s policy normalisation strategy between 2015 and 2019. While seeking to return to the procedures of monetary policy implementation as practiced during the Great Moderation, Fed officials underestimated how radically money markets had changed due to the legacy of the crisis and the introduction of macroprudential reforms. While Federal Reserve officials have long expressed a distaste for an expanded central bank balance sheet, the demand of the new money market environment has made large bank reserve positions all but an inevitability. Such reserves are not just necessary to cushion markets against fluctuations in the Treasury’s cash management strategies, but more broadly needed to avoid funding pressures in marginal, offshore market segments from spilling over into key domestic money markets. Overall, the Fed did not just fail to act against the build-up of such pressures early on, but rather exacerbated pressures through monetary tightening. In this light, the 2019 repo spike is best understood as a policy-induced credit crunch that resulted from a lack of attentiveness to the new money market environment, paired with a conviction that markets could be returned to something akin to a pre-crisis ‘normal’.

The Fed’s repo market interventions in September 2019 thus represent a turning point. As I have shown throughout this thesis, the Fed’s money market strategy has long relied on its capacity to enlist the private banking system as an elastic private market backstop. While the global financial crisis showed the limits of such an approach (see Chapter 4), the subsequent balance sheet expansion under QE worked to hide the core contradictions within modern liquidity governance by providing broad-based accommodative cover (see Chapter 5). Subsequently, the Fed’s attempt at monetary policy ‘normalisation’ brought these contradictions back to the fore. While the Fed’s
normalisation process was driven by macroeconomic considerations, I have shown that from a macrofinancial perspective, policy normalisation created important trade-offs between the demands of monetary, fiscal, and financial stability policy imperatives. In lieu of a broader restructuring of monetary-fiscal-financial interactions, the Fed’s re-entry into the repo market in September 2019 thus enshrined an institutional configuration in which the Fed accepts responsibility for elasticity within the (market-based) financial system by acting as a de-risking agent for repo-centric financial market structures. As I show in the next chapter, the pivot towards such a de-risking approach would soon be enshrined and expanded during the response to the Covid-19 pandemic. Viewed from the vantage point of the pandemic, the experience of the Fed’s policy normalisation process discussed in this chapter thus offers an important period of institutional learning and policy problematisation as the Fed learned to readjust its emergency lending apparatus in line with the demands of the post-crisis macrofinancial environment.
Chapter 7 – Supercharging the de-risking state: the Fed’s pandemic response

When the first wave of the coronavirus pandemic arrived in the spring of 2020 it caused, along with lockdowns, a sudden financial crisis. In responding to the emergency, loans and asset purchases dramatically expanded the Federal Reserve’s balance sheet, taking its assets from $4.1 trillion in February to $7.1 trillion in June 2020, with purchases continuing after that. By the end of 2021, the Fed’s assets had expanded to $8.7 trillion, or ten times the size of the pre-2008 period. Not only did the pandemic response render any discussion of balance sheet normalisation mute; it also invoked memories of monetary financing as central banks across the world, including the Fed, bought government debt in hitherto unseen quantities. Yet it would be mistaken to equate central bank purchases of government debt with a return to fiscal dominance. The primary purpose of asset purchases was not to coordinate central banking with fiscal policy. Purchases were driven by the overwhelming imperative to stabilise and de-risk financing conditions for private finance. They were triggered by an unprecedented and unexpected bout of volatility in the Treasury market in early March 2020 that sent shockwaves across the US financial system. In keeping borrowing costs low for private and public sectors, the staggering expansion of central bank balance sheets expanded the Fed’s de-risking strategy to a systemic imperative.

This chapter analyses the Federal Reserve’s pandemic interventions in detail. Within short order, the Fed acted to compress credit spreads in short-term money markets, expanded the reach of its interventions into offshore dollar markets and, for the first time in almost a century, intervened directly in credit markets. By intervening with overwhelming force and across markets, the Fed blurred the lines between financial stability policy, monetary policy, and fiscal policy in the effort to protect and de-risk private finance. When judged in terms of their ability to stabilise and backstop private finance, the Fed’s interventions were indisputably a success. Yet the March 2020
market turmoil and the policy response also raise broader questions about the macrofinancial organisation of US money markets. By highlighting the close integration of repo markets and sovereign debt, it showed that even the most liquid market in the world is not safe from the systemic instability of private repo finance. In a market-based financial system that is increasingly organised around secured short-term money market funding such as repo and FX swaps, the linkages between these funding instruments and collateral markets are only likely to increase. In stabilising and managing this system, the pandemic ultimately pushed the Federal Reserve to institute a set of new standing repo facilities, further entrenching its move towards a dealer of last resort function.

In line with the argument advanced in this thesis, the Fed’s pandemic interventions can be understood as supercharging its ‘de-risking’ response to the contradictions of monetary governance. In March 2020, the Fed upscaled the interventions it had already undertaken since September 2019 (see Chapter 6) and returned to the playbook established during the global financial crisis. Just as in 2008 (see Chapter 5), the Fed’s large-scale asset purchases compressed credit spreads and thereby helped to obscure broader contradictions within monetary-fiscal-financial interactions: unconventional monetary policy, in other words, was here to stay in the guise of comprehensive de-risking interventions. In analysing the Fed’s expanding de-risking operations, the chapter thus makes an important contribution towards answering the third research question set out in this thesis—namely, how post-crisis changes in central banking have shaped the Fed’s crisis intervention capacity.

The chapter is structured as follows. The first section offers an overview of the market turmoil during March 2020, highlighting in particular the instability of the US Treasury market. Sections two and three turn towards the Fed’s comprehensive crisis response. While section two offers a broad overview, section three highlights how the Fed’s interventions have blurred previously established policy divides between monetary, fiscal, financial stability, and credit policy, and between onshore and offshore dollar market support. Section four highlights several important legacies of the pandemic interventions—notably questions about Treasury market reform, the future of financial regulation, and the ever-closer entanglement of the Fed with the repo market.
7.1. The March market turmoil

When the World Health Organisation reported on January 9 2020 that Chinese authorities had identified a new virus causing serious respiratory issues in the city of Wuhan, financial markets took little notice. In the following days, the number of people infected with the virus continued to increase. On January 23, Chinese authorities imposed a lockdown in Wuhan ahead of a week of national holidays for the Chinese New Year, followed by the imposition of travel restrictions in several Chinese provinces and cities. By early February, almost 70 percent of China’s population lived under restrictions, and the Chinese economy, the second largest in the world, was being put on hold (Tooze, 2021b). At the same time, a growing number of cases reported in various countries showed that the virus had started to spread around the world. Global equity markets, especially in Asia, declined on concerns about the virus, but quickly recovered under the perception that the spread in China was contained. In the US and Europe, meanwhile, stock markets reached record highs on February 19 (FSB, 2020).

As the number of coronavirus cases continued to increase worldwide in late February, investor sentiment changed. On February 21, Italian authorities announced local lockdowns in Northern Italy following high numbers of reported cases. The virus, it was now clear, was not so easily contained. At this point, expectations shifted towards the possibility of a significant contraction in economic activity. Initially, safe haven assets such as US Treasuries saw very large price increases as investors began to shift their portfolios from riskier to safer and more liquid assets. On March 9, the WHO officially declared the Covid-19 outbreak a pandemic. Soon after, several countries announced a set of strict containment measures including lockdowns, border closures and quarantine requirements for travellers returning from high-risk areas. As the global health situation worsened, the flight to safety behaviour morphed into broad-based selling.

Initially, the prices of equities fell sharply and spreads in credit markets skyrocketed, especially in risky segments for leveraged loans and private debt (Aramonte & Avalos, 2020). Soon, funding strains spilled over into key short-term money markets, such as the FX swap market and the market for commercial paper (Eren et al., 2020b). With market liquidity conditions deteriorating further, leveraged investors saw themselves confronted with margin calls and came under pressure to rebalance their portfolios.
To meet outflows, asset managers faced having to sell assets into a falling market, exacerbating liquidity strains (Schrimpf et al., 2020). Simultaneously, emerging market economies saw the sharpest reversal of portfolio flows on record as foreign investors shed their riskier investment positions (Hofmann et al., 2020). The collapse of oil prices added to financial volatility. In early March, OPEC countries had failed to reach agreement on output cuts that would stabilise oil prices in the face of weakening global demand. As a result, crude prices dropped significantly, putting additional pressure on equity markets (FSB, 2020).

By the second week of March, the initial flight to safety had given way to a widespread dash for cash that affected even the safest and most liquid assets. The precautionary demand for liquidity originated in the real economy. Confronted with local lockdowns and expectations of an unprecedented contraction of both supply and demand, corporates and households suddenly faced the loss of a substantial part of their revenues. Cash flow problems were particularly pronounced in global value chains, as the abrupt halt in production in some areas led to missed sales and payments elsewhere in the chain, inducing immediate and widespread funding problems, oftentimes in foreign currency such as the US dollar (Pozsar & Sweeney, 2020). In turn, missed payments in US dollars cascaded across global markets as corporates drew on their local and regional banking systems for dollar liquidity. The demand for cash was so strong that markets witnessed a sudden and dramatic sale of long-term sovereign bonds, causing yields to rise sharply: investors were no longer seeking safe assets, but cash to meet their income shortfalls (Bank of England, 2020).

Figure 7.1. US Treasury yield spike

![Graph showing US Treasury yield spike from January to May 2020](image)
Following Vissing-Jorgensen (2021), Figure 7.1. plots the S&P500 index level and the 10-year US Treasury yield curve during early 2020. It shows that until March 9, the series move downwards together as news about the health crisis worsened. This movement can be expected as investors sought safety in US Treasuries, pushing prices up and yields down. From March 9-18, however, Treasury yields suddenly spiked, indicating a broad sell-off of US Treasury bonds as investors sought cash rather than safety. Data shows that selling was driven by three groups: foreign investors (both public and private), US mutual funds, and hedge funds. In total, foreign investors are estimated to have sold more than $300 billion of Treasury securities in March, whereas mutual funds sold off $236 billion in Treasuries during the first quarter of 2020. Long Treasury exposure for hedge funds, which is profitable when prices rise, fell by $242 billion during March, while short Treasury exposure contracted by $170 billion (Federal Reserve, 2020c; Ma et al., 2021; OFR, 2020).

Notably, neither of these sectors had sold many Treasuries during the global financial crisis. Fears of a large-scale liquidation of US Treasuries had long haunted US political economic strategists. In the early 2000s, commentators imagined that a Chinese sell off could drive US interest rates up and force a crisis of confidence in the dollar as global reserve currency itself. The current sell-off, however, was fundamentally different. While unprecedented, the sudden bout of volatility in the US Treasury market was not a crisis of faith in the dollar: liquidations of Treasury portfolios were triggered by a high demand for dollar cash. As Figure 7.2. shows, foreign investors were rotating out of long-term Treasury bonds and into dollar-denominated bank deposits or short-term repo that offered immediate access to dollar liquidity—a reversal from the experience of the global financial crisis, when investors were seeking safety in sovereign bonds.
Yet the severe dislocation in one of the world’s most liquid markets remains startling. Typically considered a safe asset, the US Treasury yield curve serves as an important benchmark in financial markets, and any dysfunction has far-reaching effects. The effect of Treasury market volatility on global financial conditions is compounded by its role as collateral in repo-intensive finance. Here, volatility in the underlying collateral can quickly induce margin spirals that exacerbate volatility across the entire financial system. When the price of collateral falls (yields rise), repo lenders will call margin, that is, they ask borrowers to post additional collateral to satisfy collateral requirements, leading to a broader scramble for collateral in markets. If repo borrowers run into difficulty in refinancing their positions, they scale down their balance sheets by selling assets, which exerts further downward pressure on asset prices and deteriorates market liquidity conditions. As the destabilisation of assets values exacerbates funding problems for individual institutions, downward spirals in liquidity conditions can spread through collateral networks (Borio & Disyatat, 2009; Brunnermeier & Pedersen, 2009; Gabor, 2013; Singh, 2014). Compounding this situation was the growing reliance of the Treasury market on high-speed algorithmic trading firms that increase the pace of the market. As traders were relocating to working from home arrangements, automated high frequency trades were amplifying price swings and worsening collateral movements (C. Smith & Wigglesworth, 2020).
It is difficult to ascertain which groups of sellers were most significant to the deterioration of Treasury liquidity in early 2020. The liquidation of foreign Treasury bond portfolios by itself was enormous at roughly $300 billion. More than half of foreign sales reflected liquidations by foreign official institutions, as foreign central banks sought to acquire US dollar cash to intervene in foreign exchange markets. The precautionary demand for cash on the part of foreign official reserve managers was reflected in a sizeable increase in the Fed’s foreign repo pool (Federal Reserve, 2020c). These sales may have had a particularly adverse effect on market conditions because primary dealers are required to make reasonable markets for sales by official accounts, thereby limiting balance sheet space for other trades (OFR, 2020). Within private offshore markets, East Asian institutions were the most exposed to dollar funding volatility. Following the last crisis, European banks had significantly deleveraged their global dollar loan books. Their position had been partly filled by Japanese banks, which had emerged as significant net dollar borrowers in the repo and FX swap markets in recent years (Aldasoro et al., 2019). Even more concerning were the large dollar hedging needs of East Asian non-bank actors such as life insurers and pension funds that lacked a direct central bank backstop. With investments both in US Treasuries and at the riskier end of the US credit market spectrum, including the CLO market, these actors faced significant and on-going FX funding and hedging demands in global markets that are difficult to maintain during times of heightened volatility.

Figure 7.3. Weekly changes in Treasuries in Custody for Foreign Official Accounts at the Federal Reserve ($ billion)
Adding to foreign sales was the deleveraging of domestic institutions. During March 2020, US mutual funds contributed about one third of the total sales of Treasuries. These funds, which are estimated to hold about one-sixth of outstanding corporate bonds, engage in liquidity transformation by offering daily redemptions to investors whilst their money is invested in illiquid assets. While facing inherent liquidity risks, the sector had seen explosive growth in the preceding decade. From 2007 to 2019, assets under management more than tripled from less than $1.5 trillion to $4.5 trillion. The unwinding of these portfolios had a dramatic impact on markets, although liquidation strategies depended on fund profile. Ma et al. (2021) find that Treasury securities were generally more likely to be liquidated than corporate bonds, reflecting a ‘pecking order’ to meet redemption requests. As bonds of higher liquidity could be sold more easily in markets—such as Treasury securities or, in the case of high-yield funds, investment grade bonds—selling pressures were primarily concentrated in these markets.

Another significant factor that contributed to the Treasury market’s reduced liquidity was securities selling among hedge funds. Hedge funds witnessed the rapid unwinding of relative value trades, a type of trade that seeks to exploit small differences in the yield between cash Treasuries and corresponding Treasury futures contracts (Schrimpf et al., 2020). Due to regulatory treatment, Treasury bonds are usually slightly cheaper than futures, allowing hedge funds to make a profit by buying cash Treasuries and selling the corresponding futures contract. As these price differentials are minimal, hedge funds rely on cash borrowed in the repo market to leverage their positions. Yet as volatility increased in early March and cash-futures spreads widened, many hedge funds found themselves confronted with mark-to-market losses on their investments and decided to unwind their trades (Barth & Kahn, 2020; Cheng et al., 2020). The sell-off of positions pushed the price of Treasuries down, resulting in a collateral margin spiral that caught other repo actors in its wake (Schrimpf et al., 2020).

The risks that hedge funds had taken on were well-known to regulators and policymakers. Following the global financial crisis, hedge funds had been left unaffected by new leverage restrictions imposed on banks. As a result, basis trade activity that requires a high degree of leverage migrated from banks to hedge funds and other less regulated entities (Rennison, 2019). Even though the risks of these trades were known to regulators since the collapse of Long-Term Capital Management
in 1998, hedge fund basis trade activity expanded steadily. By 2016, activity had grown to an extent that the Financial Stability Oversight Council identified hedge funds as a likely source of instability during crisis (US Treasury, 2016). To address the situation, FSOC recommended that regulators gather more granular data on hedge fund trading activity to better monitor their business operations—data that was missing from existing filings of fund managers to the Securities and Exchange Commission. A few weeks after the recommendation, FSOC’s hedge fund working group was deactivated by the incoming Trump administration. Once Treasury Secretary Mnuchin, a former hedge fund manager, assumed control of FSOC, discussion turned to relaxing oversight instead (Smialek & Solomon, 2020). The rapid growth of basis trades from 2018 onwards—partly a result of the declining foreign demand for Treasuries—grew unchecked.

Given the lack of granular data on hedge fund activity, there is some debate around their role in the events of March 2020. Data is especially opaque for entities registered in offshore financial centres. High volumes of Treasury sales from the Cayman Islands, for instance, are more than likely connected to the activities of hedge funds (Cheng et al., 2020). The Federal Reserve’s own assessment appears to have been influenced by early estimates by Vissing-Jorgensen (2021), who attributes a rather muted role to hedge funds. As Lorie Logan (2020), Vice President of the New York Fed, put it in a speech in October, ‘in the context of broad-based selling pressure, though, I think of these sales [by hedge funds] as an important contributing factor, but not the sole source of the challenges’. By contrast, research from the Bank for International Settlements identifies hedge fund activity as the key factor of Treasury market volatility, with selling heaviest amongst the most leveraged funds (BIS, 2020a, p. 44; Schrimpf et al., 2020). Yet even if it is difficult to assess the role of hedge funds definitively, their contribution is likely significant. In fact, hedge fund selling might have been more destabilising than other selling precisely because of the opaqueness of their operations both to regulators and market participants: market sentiment turns faster when the source of vulnerability remains unknown (Tooze, 2021a).

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26 Former Fed Chairs Yellen and Bernanke also attribute a significant role to hedge fund activity (Bernanke & Yellen, 2020).
According to many market observers, hedge funds fulfil a useful role in financing the US government by engaging in Treasury market arbitrage trades. But the destabilising function of relative value trades had already been on display during the September 2019 repo episode. Now, this event looked like a ‘canary in the coal mine’ (Schrimpf et al., 2020, p. 5) for the March 2020 turmoil. The tight integration between the Treasury market and repo markets made the unthinkable possible: that collateral requirements and associated margin spirals could destabilise even the safest of safe assets. Just like in September 2019, the repo connection also points to the role of prime money market funds in withdrawing funding at the very moment that repo borrowers needed to roll over their trades: during the last two weeks of March, prime MMFs suffered outflows of about $200 billion, or 20 per cent of assets under management. As prime MMFs offer daily liquidity to shareholders at net asset value, sudden outflows force MMFs to liquidate large parts of their portfolios in short order, including scaling back their lending in the repo market to hedge funds and dealers (Eren et al., 2020b).

Confronted with the flood of sales and liquidations, banks and dealers struggled to absorb the sudden supply of Treasury securities. Under normal circumstances, the depth and liquidity of the Treasury market would allow buyers to absorb even large sales of Treasury securities without broader disruptions. But dealer inventories were already stretched, especially from 2018 onwards. By March 2020, primary dealer net Treasury coupon exposure reached $222 billion, up from $162 billion in January. This high exposure made it difficult for dealers to make markets because intraday trading activity requires taking on additional Treasury exposure, which poses challenges to dealers’ risk management. As such, it is possible that some primary dealers reached their capacity to absorb further sales of Treasury securities, leading to a broader deterioration in Treasury market functioning (Federal Reserve, 2020c; OFR, 2020). As a result, dealers faced severe difficulties in absorbing the unwind of hedge fund positions, especially as extreme price fluctuations in Treasuries made it difficult for dealers to finance their inventories in the repo market, and prime MMFs had withdrawn repo funding (Schrimpf et al., 2020).

In previous years, US banks had reacted to increased dollar funding demand by reducing their excess reserve holdings at the Federal Reserve to increase repo and FX swap lending, often by channelling funds internally to their broker-dealer arms. Yet
as corporations started to draw down their credit lines, banks were forced to prioritise real-economy lending over market-making and arbitrage trades in the short-term money and FX swap markets. The resulting fragmentation of funding markets caused both repo and FX swap-implied funding spreads to widen dramatically, further exacerbating funding strains in short-term money markets (Avdjiev et al., 2020). With short-term funding markets impaired and the status of US sovereign debt itself in doubt, markets had reached the point of a sudden but momentous meltdown. The only institution capable of stabilising such a situation is the central bank.

7.2. The Fed’s emergency lending apparatus during the crisis

Across the world, central banks initiated a variety of unprecedented interventions to cushion the contraction in economic activity. According to a BIS survey, reactions followed a similar pattern, with the pace and timing of interventions mirroring the spread of the virus and the market turmoil it created. Initial policy announcements mostly involved interest rate cuts. As lockdown measures started to be enforced, central banks increasingly resorted to lending operations. At the same time, many EME central banks announced foreign exchange operations to ease exchange rate pressures and reduce FX volatility. As time progressed, central banks shifted towards asset purchases, first to improve market functioning and later to facilitate the financing of both private and public sectors. Throughout the same period, central banks began to adjust regulatory requirements to free liquidity restricted by prudential regulation (Cantú et al., 2021). In total, 17 AE central banks, 55 EME central banks, and 31 LIC central banks took measures to support financial markets during the pandemic (IMF, 2020a).

The Federal Reserve first reacted to the news about the virus on March 3 by cutting interest rates by 50 basis points, placing the Fed funds target range between 1 to 1.25 percent. In the second week of March, however, growing market turbulence made it clear that a conventional policy response would not be sufficient. With the US Treasury market in turmoil and equity markets in free fall, more dramatic forms of intervention were needed. If the market situation was not dire enough, political pressure on the Fed was mounting too. On March 9, President Trump summoned his
Treasury Secretary Steve Mnuchin, demanding that he push the Fed into action to save the stock market. The next day, the President took to Twitter to vent his anger at Fed Chairman Jerome Powell publicly: at this moment, it appeared unclear how the US crisis response would unfold (Tooze, 2021b).

Behind the scenes, the Fed had already begun to accelerate its crisis response. Fed officials drew on the playbook established during the global financial crisis, though both the speed and scope of interventions would dramatically outsize the response seen during the previous crisis. Starting on March 9, the Fed increased its offerings in the repo market, where it had been active since the events of September 2019. By March 12, the Fed was offering up over $1 trillion in repo support—with $500bn allocated for 1-month term repo and 3-month term repo, respectively, and an additional $174 billion in overnight repo (New York Fed, 2020). With repo offered twice a day, both in the morning and afternoon, these operations were designed to meet all demand at the minimum bid rate (FOMC, 2021, p. 6). Yet it was an open question whether it would be enough. As Treasury market volatility continued to impair other markets, the Fed began to intervene more directly. On March 12, the Fed announced that it would scale up its pace of Treasury securities purchases. The following day, the Fed brought forward about half of the Treasury acquisitions previously scheduled for the mid-March to mid-April period, purchasing $37 billion in one day (FOMC, 2021, p. 17).

On Sunday March 15, the Fed announced the next set of moves in an unscheduled press conference. First, it cut interest rates to zero—a move it had only done once before, at the height of the global financial crisis in 2008. Second, to stabilise markets, it increased its asset purchases by buying at least $500 billion in Treasury securities and $200 billion in agency MBS. The Fed started big: by Tuesday, it had purchased about $80 billion, more in two days than it would buy in a typical month during QE1 or QE2. The final big announcement was that the Fed would ease the terms of lending on its standing unlimited central bank swap network, thereby addressing dollar funding pressures in the biggest offshore markets (Federal Reserve, 2020a).

Despite the Federal Reserve’s announcements, markets continued to fall. On Monday March 16, circuit breakers had to kick in to prevent equity markets from going into free fall. For a moment, further trading was automatically halted. Conditions continued to deteriorate in global markets as well. In Europe, ECB President Christine Lagarde
had created a stir when she had told a news conference on March 12 that the ECB was ‘not here to close spreads’ between the borrowing costs of member states. It was a comment that put the lessons of the euro crisis into question and caused a spike in borrowing costs for Italy, the eurozone member hit hardest by the pandemic at this point. Within minutes, Lagarde had to backtrack, but the damage was done. For the first time in years, the ECB’s commitment to European financial stability was put in question. It was not before March 18 that the ECB would create a major bond buying programme and set the stage for a turnaround in Europe (Tooze, 2020, pp. 179-181).

In the meantime, the Federal Reserve introduced new facilities to support the various segments of America’s financial system. On March 17, the Fed added the Primary Dealer Credit Facility (PDCF) to support broker-dealers and repo markets via its critical intermediaries, the primary dealers. On the same day, it established the Commercial Paper Funding Facility (CPFF), and a day later, the Money Market Fund Liquidity Facility (MMFLF). On March 23, it added the Term Asset-Backed Securities Loan Facility (TALF) to lend to a wider set of financial firms. At the same time, the Fed expanded its scope of offshore dollar lending. Already on March 19, it had expanded its standing swap line network to include another nine foreign central banks—the same central banks that had already received a swap line during the global financial crisis. The next day, it moved to ease offshore funding conditions further by increasing the frequency of 7-day swap operations conducted within the core, standing swap network from weekly to daily. On the March 31, it announced its final offshore intervention: the creation of a repo facility for Foreign and International Monetary Authorities. The FIMA repo facility allows foreign central banks to tap dollar funding from the Fed directly in exchange for Treasury securities. Designed as a pure backstop at a high price, the facility remained largely unused (FOMC, 2021).\footnote{The FIMA repo facility can be seen as a ‘second best’ swap line, as it allows foreign central banks to exchange dollars not against their own currencies, but against the US Treasury securities in their foreign exchange reserve holdings. At the same time, the facility fulfils a domestic function by giving foreign official reserve managers an ‘outside’ option through which to obtain dollar liquidity, effectively preventing them from exacerbating volatility by selling Treasury securities into a falling market.}
The Fed’s money market interventions were comprehensive. Within short order, it had compressed interest rates across short-term funding markets, extending from secured (repo and FX swap) to unsecured market segments (such as Fed funds and commercial paper). The interventions dramatically inflated the Fed’s balance sheet, and ongoing asset purchases would continue to do so in the following months (Figure 7.4.). To keep market rates subdued, the Fed further moved to ease certain regulatory restrictions such as leverage ratios on dealer banks, allowing them to use their balance sheet more proactively to absorb funding stresses. Yet despite all these interventions, it was not obvious that it had done enough. Money market interventions did not get at the heart of the problem, which unlike in 2008 did not originate within the (shadow) banking system. This time, the problem concerned real economy cash flow and associated missed payments, caused by the virus and lockdown measures. To bridge this gap and guarantee income streams for corporates and households as well as mount the medical response necessary to meet the crisis, monetary policy itself was insufficient.

On March 23, the Fed decided to do more: it would have to intervene in credit markets directly. Between then and mid-April, it established nine separate facilities to backstop private credit markets. The first radical step was the establishment of two facilities to provide credit to large employers itself. The Primary Market Corporate Credit Facility (PMCCF) would buy debt or loans directly from corporations, whereas the Secondary

Figure 7.4. Quarterly changes in Federal Reserve holdings of US Treasuries and MBS ($ billion)
Market Corporate Credit Facility (SMCCF) would buy corporate debt in secondary markets, including from exchange-traded funds. To shore up confidence further, it further extended a near-unlimited backstop to public debt by lifting all limits on Treasury purchases. Unlike with its money market interventions, its foray into credit markets exposed it to considerable credit risk. To cover this contingency, it invoked Article 13(3) of the Federal Reserve Act, allowing potential losses to be met with equity from the Treasury’s Exchange Stabilization Fund. Political cover for its credit facilities was provided by the Coronavirus Aid, Relief, and Economic Security Act, also known as the CARES Act. Approved by Congress on the 25\textsuperscript{th} of March 2020, the CARES Act came into effect just after the Fed had announced its first credit lines, and retroactively legitimised its interventions (Menand, 2021).

\textit{Figure 7.5. Usage of Emergency Facilities and Primary Credit Programme ($ billion)}

The CARES Act opened the door for a set of further credit programmes. On April 9 the Fed took additional actions to provide support to the economy. First, it sought to bolster the effectiveness of the Small Business Administration’s Paycheck Protection Program (PPP) by supplying liquidity to participating financial institutions through financing backed by the PPP Liquidity Facility. In a next step, it announced the Main Street Lending Program to ensure credit flows to small- and medium-sized enterprises.
Under the umbrella programme, the Fed operated five separate lending facilities: three business loan facilities and two non-profit facilities (FOMC, 2021, p. 31). To increase the flow of credit, it also expanded the size and scope of its existing Primary and Secondary Market Corporate Credit Facilities (PMCCF and SMCCF) as well as the Term Asset-Backed Securities Loan Facility (TALF). In a final step, the Fed introduced the Municipal Lending Facility (MLF), under which it earmarked $500 billion to support short-term notes issued by large cities and counties and states (Federal Reserve, 2020b).

**Table 7.1. Timeline of Federal Reserve interventions in 2020**

<table>
<thead>
<tr>
<th>Date</th>
<th>Intervention</th>
<th>Size</th>
<th>Eligible Counterparty/Beneficiary</th>
<th>Collateral/Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.03</td>
<td>FOMC lowers Fed funds rate target range &amp; primary credit rate by 50 bps</td>
<td></td>
<td>Depository institutions</td>
<td></td>
</tr>
<tr>
<td>09.03-12.03</td>
<td>Increase in overnight and term repo offerings</td>
<td>$1.5tn</td>
<td>Primary dealers</td>
<td>Treasuries, agencies</td>
</tr>
<tr>
<td>13.03</td>
<td>Outright Treasuries purchases</td>
<td>$37bn</td>
<td></td>
<td>Treasuries</td>
</tr>
<tr>
<td>15.03</td>
<td>FOMC lowers Fed funds rate target range by 100 bps &amp; primary credit rate by 150 bps</td>
<td></td>
<td>Depository institutions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outright Treasuries purchases increase/agency MBS purchases start</td>
<td>At least $500bn/$200bn</td>
<td></td>
<td>Treasuries, agencies</td>
</tr>
<tr>
<td>17.03</td>
<td>Increase of morning overnight repo</td>
<td>$500bn</td>
<td>Primary dealers</td>
<td>Treasuries, agencies</td>
</tr>
<tr>
<td></td>
<td>Primary Dealer Credit Facility (PDCF)</td>
<td>Unlimited</td>
<td>Primary dealers</td>
<td>Treasuries, agencies, corporate bonds, equities</td>
</tr>
<tr>
<td>Date</td>
<td>Facility Description</td>
<td>Issuer/Recipient</td>
<td>Details</td>
<td>Type</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>18.03</td>
<td>Commercial Paper Funding Facility (CPFF)</td>
<td>Unlimited</td>
<td>US issuers of commercial paper rated at least A-1/F-1/P-1</td>
<td>Commercial Paper</td>
</tr>
<tr>
<td>19.03</td>
<td>MMF Liquidity Facility (MMFLF)</td>
<td>Unlimited</td>
<td>US depository institutions, US branches of foreign banks on-lending to prime MMFs</td>
<td>Treasuries, agencies, commercial paper</td>
</tr>
<tr>
<td>23.03</td>
<td>Establishment of temporary swap lines</td>
<td>Various</td>
<td>Central banks of Australia, Brazil, Denmark, S. Korea, Mexico, Norway, New Zealand, Singapore and Sweden</td>
<td>Foreign currency</td>
</tr>
<tr>
<td>23.03</td>
<td>Fed pledges open-ended Treasuries purchases</td>
<td>Unlimited</td>
<td>Treasuries</td>
<td></td>
</tr>
<tr>
<td>23.03</td>
<td>Term Asset-Backed Securities Loan Facility (TALF)</td>
<td>$100bn</td>
<td>US companies with eligible collateral and account relationships with primary dealers</td>
<td>Asset-backed securities</td>
</tr>
<tr>
<td>23.03</td>
<td>Primary Market Corporate Credit Facility (PMCCF)</td>
<td>$500bn</td>
<td>US companies with investment grade ratings before 22 March</td>
<td>Corporate bonds and business loans</td>
</tr>
<tr>
<td>23.03</td>
<td>Secondary Market Corporate Credit Facility (SMCCF)</td>
<td>$250bn</td>
<td>US companies including those with junk ratings</td>
<td>Corporate bonds and ETFs</td>
</tr>
<tr>
<td>31.03</td>
<td>Fed announces FIMA repo facility</td>
<td>Unlimited</td>
<td>Foreign monetary authorities</td>
<td>Treasuries</td>
</tr>
<tr>
<td>09.04</td>
<td>Municipal Lending Facility (MLF)</td>
<td>$500bn</td>
<td>States, cities with population over 250,000 and counties with population over 500,000</td>
<td>Short-term municipal bonds</td>
</tr>
<tr>
<td></td>
<td>Paycheck Protection Program Loan Facility (PPPLF)</td>
<td>$669bn</td>
<td>Depository institutions that originate PPP loans guaranteed by the Small Business Administration</td>
<td>Business loans</td>
</tr>
<tr>
<td></td>
<td>Main Street Lending Program (MSLP)</td>
<td>$600bn</td>
<td>Small and medium-sized businesses and non-profits</td>
<td>Business loans</td>
</tr>
</tbody>
</table>

### 7.3. Blurring the lines: making sense of the Fed’s interventions

The array of interventions is difficult to disentangle. Within a few days, multiple interventions sought to stabilise secured and unsecured short-term funding markets simultaneously. One advantage for the Fed was that it could draw on the expertise established during the global financial crisis. Facilities such as the Primary Dealer Credit Facility or the Commercial Paper Funding Facility had first been pioneered in 2008. This allowed the Fed to respond to developments in financial markets at record
speed. Yet interventions also included some significant innovations, most significantly in credit markets. Complicating the story is that, understood as a whole, these interventions blurred the lines between emergency response and monetary policy; between onshore and offshore market interventions; and between monetary and fiscal policy. This section discusses these intersecting issues.

First, I focus on the Treasury-repo complex. The Fed’s early recourse to large-scale asset purchases blurs the line between emergency response and monetary policy in the effort to stabilise the most central dollar market. Yet the speed and scale of intervention also invoked memories of monetary financing and poses questions about the future of monetary-fiscal cooperation. Second, I turn to the Fed’s central bank swap lines. Typically understood as a market backstop, its large-scale intervention in offshore markets exerted a gravitational pull on domestic market rates and thus helped ease credit conditions even within US markets. Through its swap lines, the Fed moved from stabilising to shaping the interconnections between tightly integrated global and domestic dollar markets. Finally, I analyse its credit lines. By exposing the Fed to credit risk, these interventions expanded its reach into areas it had long shied away from. While opening a path for a potential revival of credit policy, these interventions also throw up thorny questions about its relationship to the Treasury and Congress.

7.3.1. The Treasury-repo complex

The Fed’s interventions in the repo and the US Treasury market were closely interlinked. Following the September 2019 repo episode, it remained active in both markets: in early 2020, it conducted reserve management purchases of Treasury securities of about $60 billion per month and continued both overnight and term repo operations to ensure that the supply of reserves in the system remained ample. With the onset of the pandemic, it scaled up its involvement in both markets, starting with the repo market. As repo lender, the Fed was effectively propping up the Treasury market by helping others to continue buying Treasuries. Once this proved insufficient to ease volatility, it opted to intervene in the market directly, purchasing increasing quantities before making an open-ended asset purchase commitment on March 23. The pace of purchases peaked at roughly $76 billion per day in late March, before being reduced in stages as liquidity conditions in the Treasury market stabilised.
Cumulatively, the Fed purchased approximately $2 trillion of Treasury securities between March 15 and the end of 2020 (FOMC, 2021, p. 17).

Treasury security purchases were supplemented by purchases of agency MBS. Closely tracking Treasury security purchases, the daily price of agency MBS purchases peaked at roughly $37 billion in late March, before being reduced in stages. Cumulatively, the Fed purchased about $1.46 trillion in agency MBS between March 15 and the end of 2020 (FOMC, 2021, pp. 21-22). The quantity of MBS purchases is at first glance surprising. Unlike in 2008, the 2020 crisis was not centred around mortgage-backed securities: this was not a crisis driven by an implosion of faulty credit products, but instead an acute cash flow crisis induced by a simultaneous supply and demand shock. Unlike in 2008, then, there was little reason for the Fed to purchase ‘toxic’ credit products. MBS purchases however appear more useful once we consider the maturity distribution of asset purchases. For Treasuries, most purchases were located within the shorter end of the maturity distribution. MBS purchases, by contrast, are almost all in the more-than-ten-year range. As such, MBS purchases offer a potential avenue for the Fed to push long-term interest rates down without bending the Treasury yield curve itself out of shape (Neilson, 2021). In total, asset purchases contributed significantly to the expansion of bank reserves during 2020.

Figure 7.6. Factors affecting Reserve balances in 2020 ($ billion)
However, asset purchases were not merely a means of shaping long-term yields. The Fed placed Quantitative Easing at the very heart of its crisis response: by some estimates, its Treasury securities purchases might have been enough in and of itself to contain the crisis. It offered the latest confirmation that ‘unconventional’ policies as adopted in the wake of the global financial crisis had become increasingly conventional, the tools central banks use during a crisis almost indistinguishable from those they use for normal times (Borio, 2020). Traditionally, balance sheet policies had been associated with mechanisms to stabilise markets independently of the interest rate channel. Yet as the failure of taper in the years preceding the pandemic showed, the deployment of large central bank balance sheets had become increasingly integral to attempts to price liquidity within financial markets. During the pandemic response, these institutional mechanisms were on clear display: through its intervention, the Fed did not simply backstop markets but intervened across the board to ease public and private sector borrowing costs.

For some, large-scale interventions in the sovereign debt market signalled a form of monetary financing. It invoked memories of war finance that saw central banks acting in support of government in a common effort (Pozsar, 2020b). Others spotted a more insidious return to the heyday of fiscal Keynesianism when central banks did governments’ bidding with inflationary results (Dabrowski, 2021). Yet it would be misleading to categorise the sudden return of monetary financing as a paradigm-shattering moment. As Gabor (2021a) argues, pandemic-driven purchases of government bonds amounted to a ‘revolution without revolutionaries.’ Central bankers did not set out to change society or the practices of central banking when they engaged in such activities. On a monetary policy level, asset purchases were a means of manipulating long-term yields, a way to anchor inflation expectations by reinforcing the signalling effect of central banks’ interest rate policy and thereby stimulate aggregate demand. On a financial stability level, sovereign bond purchases seek to preserve market liquidity in collateral markets and backstop the balance sheets of private financial actors. Seen this way, monetary-fiscal coordination is an optical illusion: it serves not the refinancing needs of government in the same ways as classical monetary financing does. Instead, current arrangements signal a ‘commitment to maintain cheap financing conditions for private finance’, the easing
of financing conditions for fiscal authorities more a by-product than the ultimate intention (Gabor, 2021a, p. 22).

In line with the argument advanced in this thesis, the pandemic purchases should thus be seen as indicative of the Fed’s de-risking approach: as the lines between financial stability and monetary policy considerations become blurred, it hardwires further non-crisis interventions into central banks’ toolkits. Where sovereign bonds serve as key collateral in repo-intensive finance, long-term yields play a critical role in the transmission of monetary policy that cannot be benignly neglected. Monetary policy, in other words, cannot confine itself to targeting short-term rates: it needs to keep volatility in long-term rates low so as not to upset conditions in collateral markets (cf. Sissoko, 2020). Ultimately, and without a broader realignment of monetary-fiscal-financial interactions, the reliance on market-based private finance thus commits central banks to asset purchases or repo interventions, an issue I return to at the end of this chapter.

7.3.2. **Swap lines and the offshore market**

The Fed’s other significant money market intervention was in the offshore markets. From the second half of March onwards, swap lines put a ceiling on offshore dollar funding costs. Swap lines lower FX swap rates in two ways. First, by allowing banks to borrow ‘outside’ dollars via their central bank, these banks can cover their own funding costs as well as offer dollars against domestic currency in the FX swap market, thereby directly increasing the amount of dollars available in these markets. Through these activities, banks theoretically help arbitrage away the price difference between the cheap outside funding provided by their central bank and elevated market rates (Bahaj & Reis, 2019). Banks would thereby pass through cheaper funding conditions to institutional investors and other non-banks that were relying heavily on the FX swap market to finance their dollar operations, yet do not enjoy direct access to dollar liquidity via their central bank (Avdjiev et al., 2020). Second, by providing an ‘outside’ option for banks via their domestic central bank, the swap lines essentially ‘free up’ US dealer-bank balance space on which foreign banks would otherwise rely to access dollars. This allows dealers to lend more freely to non-banks in the FX swap market, meeting elevated demand. Collectively, these activities effectively
disincentivise foreign investors from liquidating Treasuries to obtain dollar liquidity and helped stabilise markets.

The extent of offshore funding pressures during early 2020 can be seen in the quick take-up of swap line offerings. Outstanding swap amounts peaked at $449 billion in May 2020, second only to the drawings seen at the height of the global financial crisis, and significantly higher than during the Eurozone crisis (Figure 7.7.). In addition, unlike during the previous crises, this time most of the lending did not go to Europe: in the key period from March to May 2020, the ECB only accounted for about 32 per cent of swap line take up, compared to 47 per cent by the Bank of Japan. By contrast, during the global financial crisis, the ECB accessed almost 80 per cent of swap line lending. The shift is testament to the increasing role of Japanese financial actors in US markets, as European banks had scaled back their exposures following the experience of the last crisis.28

![Figure 7.7. The Federal Reserve’s central bank liquidity swap lines](image)

Outstanding swap amounts by counterparty during the global financial crisis and the Covid-19 pandemic, in $ billion

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28 Especially Japanese non-banks such as life insurers without direct access to their central bank’s swap line were facing high dollar demands. Due to the need to pass-through dollar funding to non-bank actors, there was a considerable lag in bringing down the cross-currency basis for the Yen compared to other currencies, partly explaining large swap line drawings by the Bank of Japan (Eren et al., 2020a).
Yet swap lines arguably went beyond emergency lending. By reducing swap pricing to OIS+25 bps, the Fed was offering offshore dollar liquidity at prices well below pre-stress levels. More than simply backstopping markets, swap lines exerted broader effects on yields and lending behaviour. Effectively, the Fed moved from controlling the bounds within which offshore interest rates trade towards compressing credit spreads altogether. These interventions had significant consequences for the shape of cross-border credit relations. In normal times, offshore dollar rates generally trade at a premium to funding rates in domestic dollar markets. This allows US financial institutions to take advantage of arbitrage opportunities by lending in the offshore markets. In April 2020, the Fed’s aggressive manipulation of offshore funding rates momentarily reversed this dynamic: by offering favourable funding conditions abroad, the Fed incentivised foreign institutions to lend dollars back into US markets. Swap lines thus managed to exert a gravitational pull that dragged down even domestic short-term funding rates.

The interplay of FX swap funding and domestic market rates can be demonstrated through an analysis of the US commercial paper (CP) market segment. As the previous chapter has described, the CP market plays a significant role in influencing LIBOR rates, having replaced interbank rates as the key source of unsecured global dollar funding for banks. For this reason, volatility in the US CP market was the main factor behind the LIBOR-OIS spreads in early 2020, turning the market into a crucial intersection between global and domestic money markets (Eren et al., 2020a).
The turmoil in the CP market saw three distinct phases. During the first phase, in the last two weeks of March, prime MMFs suffered sudden outflows of about $200 billion (Eren et al., 2020b). As prime MMFs offer daily liquidity to shareholders at net asset value, sudden outflows force them to liquidate large parts of their portfolios in short order. Yet as prime MMFs sought to substitute CP for more liquid short-term assets such as Treasury bills, dealers struggled to absorb the large inflow of CP amidst regulatory restrictions on their ability to expand their balance sheets (IMF, 2020b). Dealer inventories only expanded significantly after March 18, after the Fed announced the PDCF and the MMFLF, and lifted capital and leverage requirements associated with lending through the facilities (Pozsar, 2020a). In essence, the temporary easing of regulatory restrictions worked in a counter-cyclical fashion by allowing dealers to expand their balance sheets and absorb greater order flows, and thus helped stabilize market liquidity conditions. Freed from balance sheet restrictions and provided with easy refinancing options through the Fed’s PDCF, dealers began to conduct risk-free arbitrage: as MMFs stopped buying, dealers could not ‘underwrite and hold’: dealers were underwriting CP at rates up to 250 basis points, while funding themselves at the PDCF for 25 bps (Pozsar, 2020a, p. 2). They could extract such favourable terms from foreign banks because offshore dollar funding costs suggested a scramble for dollars reminiscent of the situation during the global financial crisis (Avdjiev et al., 2020).

The second phase of money market turmoil was characterized by the effect of the swap line uptake. From early to mid-April, LIBOR-OIS spreads started to fall, and the cross-currency basis even went positive in some cases, offering a discount on dollar borrowing (see Figure 7.8.). At this point, funding prices started to fragment. For banks in monetary jurisdictions with access to a swap line, FX swap funding costs implied a discount, whereas other banks without access to cheap outside risk-free funding still struggled with a dollar funding premium in private markets (Eren et al., 2020a). By setting the price of swap lines at OIS+ 25 basis points, the Fed was offering an incredibly tight spread for market rates: rather than simply providing a price floor by backstopping funding liquidity at a premium, swap lines were setting market prices directly, prompting other market rates to fall in line. Yet as only some banks had access to this risk-free funding rate via swap lines, ‘something like a tug of war emerged’ between swap line rates and interbank rates as to which one would anchor FX swap
pricing, a process that eventually dragged down FX swap implied funding costs significantly (Eren et al., 2020a, p. 4).

Figure 7.8. Offshore dollar funding conditions during early 2020

In the third phase, falling FX swap costs triggered inflows into prime MMFs that calmed US CP rates. During the last two weeks of April, LIBOR-OIS fell by a dramatic 62 bps as foreign banks brought liquidity from offshore markets back into the domestic CP market (Pozsar, 2020a). Spurred by the on-going fall in the FX swap implied cost of dollar funding, foreign banks suddenly found it cheaper to raise dollars offshore in the FX swap market and then lend at LIBOR prices. For instance, a European bank could raise three-months unsecured euro-denominated funding in European markets, then swap into US dollars by paying the FX swap spread, and still lend profitably at elevated LIBOR rates. Such arbitrage trades contributed to a narrowing of spreads (a reduction of LIBOR rates), and thus indirectly helped reduce stress in the CP market (Eren et al., 2020a). As a result, foreign banks went from being price takers to price setters within a month: as funding costs fell in the CP market and prime MMFs started to see funding inflows again, foreign banks could use cheap FX swap implied funding rates to extract favourable rates for commercial paper. Over the course of a month, this brought CP funding rates down from 250 bps to around 50 bps by the end of April (Pozsar, 2020a).
In summary, swap lines exerted a profound influence on market dynamics. Swap lines effectively induced a form of international cross-currency arbitrage that saw highly unusual cross-border money flows in which foreign banks sourced dollars offshore via swap lines to ease dollar liquidity conditions in domestic US markets. Effectively, the Fed relied on a positive spillback as the transmission mechanism to shape domestic money market conditions—a dramatic reversal of the Fed’s policy stance of benign neglect towards international funding pressures discussed in the previous chapter. Though the Fed’s aggressive interventions and the violation of the Bagehotian principle of last resort lending have been justified in terms of the unprecedented nature of the pandemic shock (Hauser, 2021), they also played a useful function in restructuring the feedback effects between domestic and global dollar markets, allowing the Fed to harness international market movements for its own advantage.

7.3.3. From liquidity to credit

On the March 25 2020, Congress voted to approve the Coronavirus Aid, Relief, and Economic Security Act, also known as CARES Act. It provided extra spending, tax cuts, and funding allocations amounting to $2.3 trillion, or 10 percent of US GDP. It was the largest fiscal stimulus ever delivered within the US, and though a short-lived emergency improvisation, it had major social implications. For a moment, a combination of stimulus checks and enhanced unemployment benefits led to income increases for many millions of Americans who had lost their jobs—an unprecedented development in the United States’ infamously ungenerous welfare system. Yet it was also the result of compromise. In 2009, Republicans had staunchly opposed the fiscal plans of the Obama administration. This time, a Republican President was in office, and it was an election year. With unemployment numbers skyrocketing, it was clear that something needed to be done, though it would not be a simple extension of the welfare state. Combined with unemployment support and stimulus payment were a welter of subsidies and support for big businesses of all kinds, and changes to the tax code that would benefit private equity firms, the richest households, and large firms (Tooze, 2021b, pp. 140-141).

The large increase in federal debt could be financed without a surge in borrowing costs because of the Federal Reserve’s large-scale asset purchases. QE purchases that were
intended to stabilise the financial system thus incidentally helped fund the government’s spectacular surge in debt. The CARES Act took the monetary-fiscal tie-up even further by legitimising the Federal Reserve’s credit facilities. The Fed had acted in credit markets before. In the mid-1930s it invoked its emergency powers under Article 13(3) to provide limited loans to non-financial and non-bank financial firms in support of the Emergency Relief and Construction Act of 1932. Yet in subsequent decades, Fed credit policy fell into disuse and subsequent interventions occurred under the guise of lender of last resort actions, as opposed to credit policy (Bordo & Duca, 2021). Following the global financial crisis, a provision of the Dodd-Frank Act of 2010 had limited the Fed to ‘providing liquidity to the financial system’. While allowing the Fed to act as a dealer of last resort to shadow banks it prevented the Fed from using 13(3) to lend to the real economy. Instead of removing this obstacle to central bank credit policy, the CARES Act developed a workaround. It appropriated funds for the Treasury Secretary to invest in Fed facilities that lend to the real economy under the guise of providing liquidity to the financial system. While authorising the Fed’s activities, the new arrangement thus leaves a tension between the CARES Act and the Fed’s background rules, limiting the facilities to the status of exception, not the new normal (Menand, 2021). Under the arrangement, $454 billion of funding under the CARES Act was reserved as a congressionally approved loss-absorbing fund for the Fed. Linked to a leverage ratio of 10:1, it provided the Fed with the backing to provide at least $4.5 trillion in loans. The arrangement was a legal technicality rather than an economic necessity, cloaking and legitimising the Fed’s quasi-unlimited firepower.

The reason for Fed intervention was clear. Amidst the pandemic-induced shutdown, investors became increasingly risk-averse and less likely to invest in private label securities, thereby limiting access to commercial paper and bond markets for non-financial firms. Similarly, state and local (municipal) governments faced a sudden loss of income due to diminished sales tax revenues at the same time as their debt market access was impaired. As households and corporates were withdrawing cash from the mutual fund sector, the resulting fire sale of government, corporate and municipal bonds fuelled a liquidity crisis in the municipal bond market in March and early April (Li & Lu, 2020). In short, external finance became blocked as investors were unwilling to buy private debt and intermediaries were unwilling to lend to many private firms.
(Bordo & Duca, 2021). As the Fed soon discovered, addressing these blockages required more than lowering interest rates or provide liquidity support to lenders: in a situation when lenders were unwilling to lend due to credit risks, easy access to financing was not enough to compel these intermediaries to provide loans to the private sector. What was required instead was to de-risk corporate debt directly. By backstopping private non-financial debt, the Fed would compel financial intermediaries to resume their lending activities. Here, the Fed followed a three-pronged approach, covering corporate bond finance, municipal bond markets, and cash flow constraints of small- and medium-sized firms.

The Fed had initially sought to support corporate bond finance by easing funding strains in the commercial paper market directly. When this proved insufficient, the Fed moved to create the Primary and Secondary Market Corporate Credit Facilities (PMCCF and SMCCF) on March 23, backed by $75 billion in loss-absorbing capital from the US Treasury. Retroactively legitimised through the passage of the CARES Act two days later, the two facilities offered to buy both newly-issued and already-issued investment-grade corporate bonds. On April 9, the SMCCF was modified to allow purchases of ETFs that invest in high yield (aka ‘junk’) bonds (Menand, 2021). As the Federal Reserve had no in-house expertise in underwriting unsecured loans to businesses, it hired BlackRock to manage the two facilities. The implication of this move was clear: BlackRock would now be able to advise the Fed to purchase bonds its own ETFs had invested in. In fact, given the size of BlackRock, it was almost impossible to avoid such conflicts of interest. Unsurprisingly, in April 2020 alone BlackRock’s flagship corporate bond ETF received $4.3 billion of investor inflows. By comparison, Vanguard and State Street’s directly competing products pulled in just $33 million and $15 million, respectively (Flood, 2020).

The Fed’s second credit intervention was in the municipal (muni) bond market. Already in March 2020, municipalities faced difficulty issuing new bonds and faced higher spreads of municipal over Treasury bond yields. On March 23, the Fed tweaked its money market fund and commercial paper funding facilities to ease the flow of credit to municipalities. On March 25, the CARES Act authorised funding for a Treasury equity stake in a Fed programme backstopping the muni market. After the announcement, muni yields dipped momentarily, but ticked up again in the following weeks (Bordo & Duca, 2021). Spreads over Treasury yields narrowed again only after
the Fed announced its Municipal Liquidity Facility on April 9. The new facility, backed by $35 billion of Treasury equity, was authorised to purchase up to $500 billion of short-term debt issues by states, large counties, and cities.\(^\text{29}\) Lacking the technical sophistication to price muni bonds correctly, the Fed hired PFM Financial Advisors LLC as its administrative agent (Menand, 2021). In its purchases, the Fed explicitly announced that it would buy eligible bonds at credit-rating based spreads, generally one percent above normal spreads. The facility was thus designed as a backstop rather than an outright means of financing municipalities (Bordo & Duca, 2021).

The Fed’s final intervention on April 9 was to support small and medium-sized non-financial firms. Here, the Main Street Loan Programs would provide support for businesses with up to 15,000 employees or up to $5 billion in 2019 annual revenues. As the Fed again lacked the expertise to negotiate such individual loan agreements, it relied on the banking system to originate, underwrite, and service the loans. To encourage prudent lending standards, banks were required to keep between 5 to 15 percent of loans on their balance sheet, depending on the facility used (Menand, 2021).

In addition to its Main Street Lending, the Fed created the Paycheck Protection Program Loan Facility. This facility functioned somewhat differently, as the Fed did not take on any credit risk. Its purpose was to de-risk the Paycheck Protection Program (PPP). Created as part of the CARES Act, the PPP provided subsidies to small firms to avoid laying off employees. It was the closest that America came to approximating European-style furlough schemes, with some studies suggesting that the programme supported up to 2.4 million jobs (cf. Tooze, 2021b, p. 140). Despite the need for such funds, however, take-up of PPP funding stalled in early April. One reason was its particular funding structure. In providing subsidies in the form of Small Business Administration (SBA) loans that were originated by banks, there was considerable uncertainty whether banks could fund a sudden surge in PPP loan requests. The Fed’s PPP Loan Facility can be understood as an answer to this problem by offering attractive discount loans to banks at near-zero interest using PPP loans as collateral. While banks were to continue to service the loans, they did not need to hold them on

\(^{29}\) On April 27, the Fed amended and lowered the population threshold for counties and cities.

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their balance sheet. In effect, the Fed was thus warehousing assets for the SBA and the banks so that neither had to keep them on their books (Menand, 2021).

In addressing these various credit strains, the Fed’s experiment in credit policy was exhaustive. Yet it was also single-minded: beyond stabilising financing conditions, there was little active consideration over which parts of the economy should be supported. This arguably exposed the Fed to credit risk. Investing in industries that seemed unlikely to recover could leave it with a portfolio of nonperforming debt and stranded assets. At the same time, by directing credit more proactively it would have violated the market neutrality principle that has guided central bank interventions in the past. Yet even if the Fed did not channel credit within the context of a fleshed-out industrial policy, its investment behaviour proved amenable to political pressure and lobbying efforts. Reporting shows that tweaks to the Main Street lending programmes that made it easier for already indebted companies to access loans and use the funds to pay down existing debt closely mirrored lobbying requests from oil and gas companies (Guida & Colman, 2020).

Yet it would be difficult to construe the Fed’s intervention as merely the misdeeds of an unaccountable technocratic monetary authority. They reflected an American political economic configuration that fuelled an upward redistribution of wealth. Thanks to ambiguities and inconsistencies, the CARES Act provided plenty of room for interpretation on how funds should be distributed. By delegating authority for the corporate bailout to the Fed, Congress further sought to end any debate around how rules were to be adopted and applied. While formally creating a structure of oversight, the Act intentionally shielded the Fed from accountability by immunising the Fed’s meetings from the requirements of the Freedom of Information Act until the end of the year. In 2008, Bernanke had failed to achieve the same sort of protection for the Fed’s activities due to a successful lawsuit by Bloomberg reporters, forcing the Fed to provide details on its secret lending decisions. This mistake was not to be repeated (Brenner, 2020).

The merger of monetary and fiscal policy under the guise of financial and systemic stability was neither unexpected nor frowned upon by the investment community (cf. Tooze, 2021b, p. 146). Already in 2019, a team at BlackRock involving Stanley Fisher, former Vice Chair of the Federal Reserve, had put forward the idea that central banks should be equipped with standing fiscal capacities of their own. Rather than
implementing the decisions of politicians, such a facility would allow the central bank to act as a fiscal authority in its own right (Bartsch et al., 2019). Despite the temporary quasi-expansion of the US welfare state, the appeal of such quasi-fiscal credit easing (or ‘Main Street QE’) for asset managers is clear. Just like quantitative easing (‘Wall Street QE’), such asset purchases supercharge the investment climate and unleash a tidal wave of money into corporate bonds and stocks. ‘Whatever it takes’ had reached the corporate economy: the de-risking state was no longer just confined to supporting liquidity conditions within the money markets.

7.4. Market structure and policy response: legacies of the pandemic interventions

Just as the market response to the pandemic had exposed inefficiencies within the structure of monetary-fiscal-financial policy within the United States, the Fed’s overwhelming crisis response had offered a momentary solution to these fractures: it acted to de-risk virtually everything. Yet as the emergency response only offered a temporary remedy, the March 2020 market turmoil thus exposed broader questions about the long-term macrofinancial organisation of money markets. This section discusses three key themes: first, the need for Treasury market reform; second, the changing role and regulation of banks and non-banks; and third, the shifting role of the Federal Reserve within the market-based financial system.

7.4.1. Treasury market reform

In early March 2020, Treasury market volatility took policymakers by surprise. The US Treasury market is generally considered the deepest and most liquid market in the world and serves as a key benchmark and strategic source of safe assets for the global financial system. Disruptions in this market were thus highly concerning for US policymakers. Yet March 2020 was far from the first episode. In recent years, the US Treasury market had experienced a series of smaller incidents of disrupted trading and heightened volatility. One such event occurred on the morning of October 15 2014, when the price of Treasuries experienced a short but sharp tremor that has become
known as the ‘Flash Rally.' These disruptions were the consequence of profound changes in market structure that had received relatively little regulatory attention. Traditionally, trading in Treasuries was organised over the counter and dominated by Primary Dealers that intermediate across both primary and secondary markets to transact with each other and investors. Given the reputational rewards associated with Primary Dealer status, these institutions would typically provide liquidity even if it came at a cost from time to time. Over the last decade, however, secondary markets in Treasuries have become more electronic and algorithmic, and dominated by high-speed electronic principal trading firms (PTFs), mostly comprising of non-bank securities firms. By early 2020, electronic-style trading activity accounted for more than 75 percent of liquidity provision in the Treasury market, up from 35 percent after the 2008 crisis (C. Smith & Wigglesworth, 2020). As a result, the interdealer market segment has become heavily competitive, with high-speed PTFs and Primary Dealers competing for market share.

Curiously, the risks associated with automation and high-speed trading have received relatively little attention within the Treasury market. Elsewhere—for instance in equity and derivative markets—the introduction of high-speed trading has led to the introduction of protective safeguards such as circuit breakers and the adoption of operational standards, including higher disclosure, reporting and surveillance standards. By contrast, the Treasury market has not undergone the intensive regulatory scrutiny needed to map emerging risks and vulnerabilities. Regulatory oversight of the market is divided between five or more federal regulators, with none holding a lead or coordinating role. This fragmentation impedes research into market risks and leaves the market ill-protected. As Yadav (2020, p. 7) argues, ‘regulators are not administratively empowered to gain an understanding of how the market works, its weaknesses, new risks, or interconnections with the rest of the financial system’. The systemic relevance of such information inefficiencies became evident in March 2020, when regulators and policymakers discovered difficulty in assessing the risk exposures of hedge funds trading in the Treasury repo and futures markets.

30 Similar events occurred on the 7th of June 2018 when trading volumes in Treasury-related securities surged abnormally; and on the 11th of January 2019 when BrokerTec, an electronic trading platform responsible for intermediating up to 80 percent of all trading volume in the Treasury interdealer market, experienced an outage (Yadav, 2021).
Knowledge gaps are particularly concerning due to the Treasury market’s crucial role in the repo market. Long regarded as safe assets, post-2008 reforms have enshrined the role of US Treasuries as key collateral within dollar-denominated repo markets. Reliance on sovereign-backed collateral\(^{31}\) supposedly de-risked repo markets, as repo transactions depend on the liquidity of the underlying collateral. But there is a problem: while Treasury securities themselves are ‘risk-free’ due to explicit backing of the sovereign, the markets in which these securities trade are not. What the March 2020 episode showed was that the logic of margin calls and forced sales can wreak havoc even in the market for the safest collateral, especially if aided by an imperfect system of intermediation and regulatory opacity. During the early pandemic response, US policymakers learned what should have been obvious since the European sovereign debt crisis: that governments, just like private asset issuers, can become vulnerable to repo pro-cyclicality and collateral crises (cf. Gabor & Ban, 2016).

In the wake of the 2020 market turmoil, various proposals have emerged to reorganise the US Treasury market, including to centralise regulatory oversight (Yadav, 2020) and expand central clearing (Duffie, 2020). The issue of central clearing in the US Treasury market has been under policy discussion for several years.\(^{32}\) With central clearing, a clearinghouse or central counterparty (CCP) steps into the middle of transactions to ensure their completion, effectively becoming the buyer to every seller and the seller to every buyer. The assumption is that central clearing would lower the overall liquidity requirements of dealers, as it would remove the need for large HQLA buffers to cover margins and settlement risks for bilateral Treasuries transactions (Duffie, 2020). The reliance on CCPs is in line with broader reform initiatives after the global financial crisis, which have seen central clearing become increasingly mandatory in derivative trading (Genito, 2019).\(^{33}\) Following the March 2020 episode, the idea of central clearing has received renewed attention by regulators (US Treasury

\(^{31}\) Law and policy extend state backing to various IOUs beyond Treasury securities, such as agency MBS.

\(^{32}\) The ‘2015 Joint Staff Report on the U.S. Treasury Market’ written by the Treasury, Fed Board of Governors, NY Fed, the SEC, and the Commodity Futures Trading Commission (CFTC) raised concerns about the lack of central clearing among trading outside the FICC-interdealer market segment. Similarly, the 2017 ‘Report to President Donald J. Trump on Core Principles for Regulating the United States Financial System’ identifies broader risks for the market in the lack of central clearing amongst PTFs (cf. Duffie, 2020, pp. 18-19).

\(^{33}\) As Genito (2019) points out, the adoption of central clearing potentially only shifts financial risks around as CCPs assume legal responsibility for contractual obligations, forcing them to shield themselves against counterparty risk through margin requirements. As such, CCPs become increasingly systemic actors.
et al., 2021), academics (Duffie, 2020; Yadav, 2020), and financial interest groups (DTCC, 2021; FIA PTG, 2021; Group of Thirty, 2021).

7.4.2. The politics of financial plumbing

Apart from such far-reaching proposals, policymakers faced more direct challenges associated with the aftermath of their March 2020 policy interventions. A key issue was whether to remove financial support and reintroduce regulatory restrictions that had been eased at the height of the crisis. The first question was whether the Fed should let the Supplementary Leverage Ratio expire at the end of March 2021. The SLR exemption had worked as a countercyclical tool by allowing dealers and banks to expand their balance sheet elastically and absorb heightened order flows. The exemption had been particularly valuable during the period of heightened asset purchases by the Federal Reserve: as these purchases created offsetting reserve deposits for the banking system, the Fed’s interventions had inflated banks’ reserve holdings dramatically. While most leverage ratios are risk-weighted, the SLR treats all assets as the same. Under the rule, bank capital must be at least 3 percent of the entire balance sheet for all banks, and 5 percent for GSIBs. The effect of Quantitative Easing is thus that bank capital requirements go up, independent of any actions taken by the bank itself (G. Baer & Nelson, 2021).

The SLR exemption had broken the link between QE and bank capital requirements. Yet it had come with conditions. At the same time as the Fed had relaxed SLR constraints on banks, it had also limited dividends and barred share buybacks. The easing of one regulation thus was compensated with the tightening of others. Yet following the results of its December 2020 stress tests, the Fed decided that it could safely allow banks to engage in buybacks again while maintaining SLR relief. At this point, the effect of the 2020 crisis was a deregulatory win on the part of banks, which continued to lobby the Federal Reserve to maintain the SLR exemption beyond its expiry date of March 31 2021, especially as the Fed continued to buy Treasuries at scale (C. Smith & Noonan, 2021). This in turn prompted a backlash from the left wing of the Democratic Party, with Senators Warren and Brown calling on the Federal Reserve to reinstate the rule.
What complicated matters was that on February 25 2021, Treasury yields momentarily spiked after a Treasury auction showed poor demand. With a new Democratic President in office and high public spending on the agenda, investors were positioning themselves for higher inflation, leading to growing investor concerns about the market’s ability to absorb large new debt issuances. The Treasury market volatility offered banks an opening to argue for the continued SLR exemption to smooth over trades. At this point, the battle over a technical rule had become highly political: for banks, trillions of dollars were at stake—as analysts at JPMorgan estimated, across the 8 GSIBs, the reintroduction of the SLR would add $2.1 trillion of leverage exposure (Tooze, 2021c). For regulatory authorities, the cohesiveness of the macroprudential project that had been put together over the last ten years was at risk. For the Biden administration, its policy agenda was in play, as the new administration’s spending plans could be dramatically undermined by a sudden bond market panic. Either way, the market impact of a rule change was far from clear. In the end, the Federal Reserve decided to let the exemption expire (Politi & Smith, 2021).

The effects on financial stability of the SLR reintroduction were minimal. The most significant outcome was to push funds from banks to MMFs, as cash-rich banks started to advise corporate clients to move money out of banks, thereby freeing up balance sheet space for more lucrative activities (Moise, 2021). The influx of funds into MMFs had been anticipated by the Federal Reserve, which in mid-March 2021 had made a subtle change to its RRP facility, lifting counterparty caps from $30 billion to $80 billion. While the RRP still yielded zero, the move offered MMFs the opportunity to park more cash safely with the Federal Reserve (Pozsar, 2021c). The adjustment had been made pre-emptively: at the time, investments in the RRP facility were still at zero, though they would grow significantly in the next months, both because of bank deposit reshuffling and a drawdown in the Treasury’s TGA balance. For the Federal Reserve, the goal was to drain liquidity from the system and slow the downward pressure on short-term interest rates.
In June, the Fed decided to strengthen the position of MMFs even further by raising the interest rate on the RRP from zero to 5 basis points. With short-term interest rates compressed at the zero-lower bound, the move triggered significant inflows into the RRP facility as MMFs suddenly faced the opportunity to seek not just safety but also positive yield at the Fed. The rate increase turned the RRP facility from a ‘passive’ tool that provided an interest rate floor to deposits pushed away by banks, into an active tool that ‘sucked’ away deposits from the banking system (Pozsar, 2021b). In addition, MMFs benefited from the Fed’s simultaneous increase in the IOER rate, which helped shift short-term repo rates higher, on which much MMF profitability hinges. Overall, it signalled an increased importance of MMFs in the implementation of monetary policy via the repo rate apparatus (Saeidinezhad, 2021).

This shift itself is somewhat surprising. As detailed in the previous chapters, the Federal Reserve has long been wary of the money market impact of MMFs. Concerns intensified after the March 2020 episode as prime MMFs withdrew significant support to the repo market to meet investor redemptions. To address the ‘flightiness’ of MMF funding, prime funds have attracted renewed regulatory attention. In December 2020, a Report of the President’s Working Group on Financial Markets recommended exploring several reform avenues for the MMF industry, including how to internalise the liquidity costs of investor redemptions and commit private resources to enable MMFs to withstand periods of market volatility, for instance via capital buffers (President’s Working Group, 2020). In early 2021, the Report’s recommendations attracted interest from the SEC, pointing towards ongoing efforts by financial
regulators to strengthen market functioning. At the same time, the Fed’s implicit recognition of the centrality of MMFs for monetary policy implementation affirms the infrastructural power of MMFs as a crucial component of repo and other short-term funding markets: ever since the institutionalisation of the RRP facility in 2013, the Fed’s engagement with repo markets in the transmission of monetary policy had involved not just primary dealers but a broader set of money market participants. As the experiences of the 2019 repo spike and the 2020 market turmoil have shown, this greater entanglement of the Fed with non-bank actors could adversely affect financial stability. The remedy thus far has been an expansion of the Fed’s de-risking interventions—an issue that I turn to now.

7.4.3. The Federal Reserve and the repo rate complex

How to stabilise repo markets is perhaps the most significant challenge for the Federal Reserve following the events of early 2020. The pandemic shock showed the significance of secured short-term funding markets for globally integrated dollar markets. Internationally, the Fed responded by extending central bank swap lines and by introducing the FIMA repo facility. Domestically, asset purchases and emergency loan facilities, including repo operations, helped ease strains in short-term funding markets. In July 2021, the Federal Reserve moved to make both the FIMA repo facility and a domestic, Standing Repo Facility (SRF) permanent. Priced above current market rates, they function as a backstop. But just like QE or swap lines, the two facilities play a role during both emergencies and normal times.

The adoption of the new repo facilities effectively institutionalised the Fed’s role as a dealer of last resort. Whereas in the past the Fed had reluctantly assumed such a role during times of systemic crises, the new facilities enshrined its role on a permanent basis. In total, the Fed is now operating four separate repo facilities (Figure 7.11.). The facilities effectively provide an ‘outside spread’ within which private market rates trade. Depending on their pricing, they offer the Fed the option to passively backstop market rates or shift rates in a desired direction. Domestically, the operations of the RRP facility are a case in point. Designed to prevent short-term money market rates from dropping below zero, the facility has long operated as an interest rate floor. At the same time, the Fed has relied on the RRP facility to strengthen its control over
short-term interest rates, as adjustments in the RRP rate allowed the Fed to push other market rates upwards as they have to compete with the RRP facility for funds.

Table 7.2. The Federal Reserve’s four repo facilities

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<th>Domestic</th>
<th>International</th>
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<tr>
<td>Liquidity-providing</td>
<td>Standing Repo Facility</td>
<td>FIMA Repo Facility</td>
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<tr>
<td>Liquidity-draining</td>
<td>Reverse Repurchase Facility</td>
<td>Foreign Repo Pool</td>
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What has prevented the Fed in the past from targeting repo rates directly was the lack of a repo ceiling—that is, a facility that would allow the Fed to add liquidity into the market and thereby prevent market rates from spiking excessively. Over the last decade, the Fed had relied on banks to act as lenders of second-to-last resort by opportunistically lending in the repo market whenever repo rates would spike about IOER rates. Yet as the previous chapter has shown, this outsourcing strategy has run into increasing difficulties over the second half of the decade, as bank balance sheet constraints have placed limits on their capacity to make markets during times of volatility. Somewhat ironically, the lack of closer coordination between monetary-fiscal-financial interactions had thus functioned as a limit to the Fed’s outsourcing strategy, prompting instead an expanded need for the Fed’s own repo market backstop facilities. The introduction of a Standing Repo Facility shows that the Fed has now come to embrace this role as a dealer or market-maker of last resort.

But the SRF functions as more than a mere market backstop. As Pozsar (2021a) outlines, the facility could have a profound impact on markets without even being used. Specifically, it could lead banks to hold Treasuries instead of reserves: banks have little incentive to sit on large ‘excess’ reserve portfolios if they now have the means to turn collateral into reserves on demand, and without upsetting private repo rates in the process. The Fed thus essentially removes the need for large excess reserve holdings above the regulatory requirements. In previous years, under Basel III, reserves had been of crucial importance: JPMorgan, the bank with the largest excess reserve buffer, had functioned as a de-facto lender of second-to-last resort, capable of lending to other market participants during periods of volatility at a price. The problem
with this arrangement, however, was that it prevented the Fed from tapering its balance sheet.

The Standing Repo Facility offers the Federal Reserve an opening to pursue balance sheet taper without repeating the policy mistake of excessive monetary tightening. Previously, direct asset purchases would create permanent reserves in the banking system, adding elasticity in the HQLA-dependent payments system under Basel III. This situation would endure until the Fed reduced reserve positions, either via liability restructuring or balance sheet taper. With the SRF, however, the Fed can create temporary reserves by repoing, rather than buying bonds. By giving dealers stable access to settlement reserves, the new facility thus will give confidence for broader money market participants such as hedge funds that operate across Treasury repo and futures markets, even after the Fed’s balance sheet taper commences. Within the new system, collateral acquires a significant role once more (Pozsar, 2021a).

Internationally, the foreign repo pool and the FIMA repo facility mirror the functions of their domestic counterparts. As the previous chapters have detailed, the foreign repo pool has supplemented the Fed’s monetary policy toolkit by incentivising foreign official accounts to trade out of Treasury bills and invest at the Fed directly. As such, the facility has played a particularly useful role in easing the bill shortage in the mid-2010s and has tightened the Fed’s grip over short-term money markets. Like the domestic RRP, the foreign repo pool thus had served as a monetary policy tool by enlisting foreign official accounts in shaping globally integrated dollar markets. Now, the new FIMA repo facility offers foreign official account holders the additional option to liquidate their US Treasury portfolios outside of private market channels, and as such provides stable funding that foreign authorities can use to lend dollars onward to their domestic banking sectors or manage their exchange rates. As a second-best option to swap lines—in which foreign central banks use their own currency as collateral, rather than US Treasury securities—the FIMA repo facility offers easy access to a steady source of dollar liquidity for foreign authorities. The main difference between the two domestic and the two foreign repo facilities is that while the domestic facilities serve private financial actors, the foreign facilities interact with foreign public actors. By transacting with public actors both unsecured (swap lines) and secured (repo facility), the Federal Reserve thus avoids taking on counterparty risks.
that it can hardly assess, given its lack of supervisory and regulatory capacities over foreign financial actors.

In sum, the Fed can now add and withdraw liquidity from the system, both domestically and globally. In backstopping markets and aiding monetary policy implementation, such as the exit from QE, the Fed’s new repo facilities thus increasingly displace the Fed’s traditional, bank-centric policy tools, including the Fed funds target. Yet by enshrining secured lending mechanisms—both repo and FX swaps—at the heart of the (global) dollar system, these new facilities also incorporate a de-risking solution to monetary-fiscal-financial interactions into the Fed’s toolkit, rather than encourage a broader realignment of liquidity governance across policy domains.

7.5. Conclusion

The Federal Reserve’s interventions during the pandemic were exhaustive. They were at once broader, bigger, and faster than anything seen during the global financial crisis, both picking up and dramatically expanding the crisis playbook. They were also a signal that enlarged central bank balance sheets are here to stay, as the Fed leveraged its privileged position within the American financial system to lend to an ever-growing list of counterparties. Yet just as after the last crisis, the legacies and political economic arrangements born out of the pandemic response remain uncertain. The experience of the 2010s both shows that the Federal Reserve is slow to adapt its policy framework and tends to remain wedded to competitive market principles. Loath to use its large money market footprint, the Federal Reserve now nonetheless must contend with the fact that its activities are far from neutral, and instead shape which trades can be done profitably and what institutions gain in importance over time.

The pandemic response thereby signals the institutional endpoint of a policy problematisation and adjustment process that the Fed had embarked on in the post-crisis period. As this thesis has argued, while monetary-fiscal-financial policy initiatives had become increasingly misaligned and even dysfunctional in the post-crisis period, concerns about political mandates, legitimacy, and the economic consequences of interventions had largely prevented a broader adjustment of policy
spheres (see Chapter 3). During the debate about policy normalisation throughout the 2010s, Fed officials continued to think of the role of ‘proper’ central banking as confined to setting short-term interest rate targets. In its monetary policy thinking, then, the Fed continued to rely on a macroeconomic approach, despite operating within a markedly transformed macrofinancial environment (Chapter 5). Whenever this approach had run into institutional difficulties, the Fed had reverted to an accommodative stance, relying on its capacity to backstop rather than shape markets (Chapter 6). Yet if the 2010s had shown that, if necessary, a de-risking approach could hide—though not overcome—the contradictions of modern monetary governance, the pandemic response took this approach to new extremes: confronted with extreme instability both at the very heart of the market-based financial system (the US Treasury market) and at its outskirts (the corporate credit market), the Fed expanded its de-risking interventions without much regard for the traditional boundaries between monetary policy, fiscal policy, and financial stability policy. As we confront a series of ever-more likely crises—ecological, social, financial—considerable central bank backing and support for fragile economic structures is only likely to continue.
In 2021, the world economy expanded at its fastest rate in almost fifty years. The Covid-19 recession, unique in artificially suppressing economic activity for public health reasons, gave way to a strong recovery once restrictions were lifted. Monetary and fiscal policy support provided a major stimulus. Growth lost momentum by the end of the year, first due to renewed lockdowns in China in response to a highly infectious new variant of the virus, and then due to the outbreak of the Russia-Ukraine conflict in February 2022. For the global economy, the war has been strongly stagflationary, as soaring commodity prices, notably energy and food, have boosted inflation everywhere (BIS, 2022).

The return of inflation has been remarkable. While central bankers had initially dismissed inflationary pressures as a temporary blip, driven by Covid-induced price adjustments, in 2022 inflation turned into a much broader surge across prices and countries. Fearing reputational damage, the central banking community has once again suppressed macrofinancial considerations in favour of a macroeconomic focus of price stability: for the time being, central banks’ ability to expand the outer limits of their mandate appears to have stalled. Instead, central bank discourse has reached back to the 1970s, the last period of sustained inflation. Drawing on historical experience, central bankers maintain once more that it is important to act pre-emptively to forestall the build-up of inflationary pressures by raising short-term interest rates and thereby weakening demand in the private economy (e.g. Powell, 2022). The Federal Reserve has been one of the first central banks to act: as inflation soared to eight percent, the Fed responded by progressively lifting its short-term interest rate target from near-zero to a range of 2.25 to 2.5 percent between March and July 2022, with further rate hikes likely (Smialek, 2022).

Yet while central bankers have been keen to invoke the lessons of the 1970s, the similarities are at best superficial. As Adam Tooze (2022, p. 45) put it, ‘to view the
1970s as a data set from which to draw technical lessons is to mistake for a laboratory experiment what was, in fact, a historic power struggle.’ The inflation of the 1970s was driven, at least in part, by the confrontation between capital and labour. The situation today is markedly different. After decades of financialisation, labour power is weak: today, the top two-fifths of the income distribution in the US account for 60 percent of consumer spending, while the bottom two-fifths account for a mere 22 percent (Foroohar, 2022). While the drivers of today’s inflation are complex and beyond the scope of this Conclusion, it seems clear that other factors, notably commodity prices and profit margins, drive much of the inflationary surge. In fighting inflation with the recipes of a bygone world, central bankers are using increasingly blunt tools.

While macroeconomic questions thus continue to dominate the politics of central banking, the macrofinancial perspective advanced in this thesis remains equally indispensable for making sense of changing market environments. From the perspective of critical macrofinance, it is apparent that current central bank policy tools are ill-equipped for the task at hand. Instead, central banks would stand to benefit from closer coordination with other policy fields, as outlined in this thesis. For instance, Meg Jacob’s and Isabella Weber (2022) have suggested that targeted price controls could play a vital role in reducing inflationary pressures and would work far more selectively than interest rate hikes. Carefully selected price caps would ‘preserve purchasing power instead of erasing it and can create an economic environment that encourages urgently needed investments—public and private alike—in workers, care, education, infrastructure, climate mitigation and more.’ As suggested by this thesis, such an approach would require a macrofinancial framework more closely attuned to the organisation of markets and the variegated demands and possibilities of economic policy—in other words, it would require the Fed to draw on the lessons of the last decade.

Following these observations on the continuing relevance of the critical macrofinance approach in the post-pandemic world, the remainder of this concluding chapter presents the key findings of the thesis and outlines key contributions and future avenues of research.
8.1. From macroeconomics to macrofinance

This thesis has focused on three questions: first, how the Federal Reserve establishes and maintains control over money market dynamics; second, to what extent new ways of acting within markets creates contradictions between established policy domains; and third, how recent changes have affected the Fed’s crisis intervention capacities. By analysing Fed policy at the level of markets—that is, at the stage of implementation rather than simply in terms of accountability, legitimacy, or political mandate—the thesis has located the politics of modern monetary governance in the institutional mechanisms, problematisations, and policy choices that influence how financial actors operate, and which actors gain in importance over time.

A key contribution of this thesis thus is to bring a critical political economy approach concerned with questions of power and institutional change to bear on the way in which central bankers understand and problematise the ‘macrofinancial’ linkages between private finance and the state. As Chapter 2 has outlined, the political economy literature has tended to assess central banking in familiar macroeconomic terms—that is, in terms of their ability to influence inflation, employment, and growth trajectories within a national economic space. In focusing on such aggregate, non-financial indicators, political economy scholarship has done much to illuminate the highly political nature of central banking and revealed how central bank activity can entrench unequal power relations within society. Yet as I have argued, the focus on macroeconomic categories has been less helpful in analysing the challenges that confront central banking after the global financial crisis. Instead of shifting the balance of power between capital and labour or moving to repress financial activity on a broader scale, central banks have primarily changed the ways in which they act within and through markets. Without challenging the dominance of finance in economic life as such, these innovations reflect the need to maintain control over evolving financial processes and thereby preserve the institutional capacity to govern the macroeconomy effectively.

To tease out the politics of this transformation within the technical conduct of central banking, Chapter 3 has developed an approach to studying the processes of monetary governance as tied up with the problem of liquidity. Following the crisis, policy economists and regulators have become more aware of the complex role of liquidity within increasingly market-based financial systems. At the same time, policy
economists have tended to view liquidity as a private market dynamic, and thereby tacitly reduced the role of the state to backstopping and accommodating the financial system in times of crisis. Here, liquidity thus emerges as a fundamental but ultimately only technical problem. As I show, we can witness a similar dynamic in recent political economy scholarship in the tradition of Hyman Minsky. Minsky’s balance sheet-centric analysis offers an excellent entry point to understanding the intricacies of (global) financial plumbing; yet it equally tends to frame liquidity as a technical problem of supporting cash flow within the economy. To move beyond this limitation, I have focused on the organisation of liquidity governance itself. I suggest that the struggle for control between the state and finance over evolving economic dynamics is not a binary struggle between states and markets, but rather intimately tied up with the distribution of governance responsibilities between monetary policy, fiscal policy, and financial stability policy. As liquidity needs are growing more complex within markets, the existing division of labour between policy fields and the lack of coordination between them provides strong obstacles for effective financial and monetary governance and sustains the continued influence of financial interests. The resulting contradictions, experimentations, and adaptations in governance techniques and practices thus provide an important entry point for a critical political economy of monetary and macrofinancial governance.

To gain a better understanding of the relationship between policy fields and market actors, Chapter 4 provided a broad historical overview of the transformation of Federal Reserve policy since the 1950s. Sidestepping the conventional macroeconomic narrative, the chapter has discussed the practices through which the Fed relates to and acts through markets—that is, it has focused on the precise operative linkages through which policy interests and market structures have become aligned as the Fed emerged as a key macroeconomic actor. As I show, turning the monetary system into a viable infrastructure for economic governance required the Federal Reserve to problematise liquidity within an evolving market landscape, rearticulate modes of interventions, and develop mechanisms to enlist financial practices as constitutive features in its monetary governance regime. For new money market practices to function as a dynamic source of growth for the economy, they needed to be embedded within a highly sophisticated and recalibrated governance apparatus—most notably through expanding the backstop facilities of the central bank, the partial dismantling of the
regulatory structure of the New Deal that impaired the free flow of credit, and by developing modes of monetary policy that credibly promised price stability. While governing through markets allowed Federal Reserve and US state officials to seemingly resolve tricky distributional questions through impersonal market forces, the extensive reliance on markets created an important contradiction at the heart of monetary governance: for markets to function effectively, the Fed found it necessary to prop up ever more intricate and interconnected market structures such as repo markets, which in turn threatened to create instability and volatility within financial markets. While central bankers and regulators long maintained faith in the ability of markets to operate efficiently with minimal interference, the global financial crisis prompted large-scale interventions that embedded the Fed within market conduct on a much more comprehensive and permanent basis.

Chapter 5 has traced the transformation of Federal Reserve policy after the global financial crisis. As the Fed’s balance sheet and money market footprint expanded dramatically in the wake of the crisis, the Fed needed to re-establish its capacity to transmit policy signals amidst a profoundly changed market environment. While political economy scholarship has tended to focus on the asset side of the Fed’s balance sheet—most notably on the ways in which large-scale asset purchases have sought to stimulate demand—I have paid close attention to the liability side of the balance sheet as well. The shift from a scarce reserves regime to an excess reserves regime required the Fed to develop new tools to maintain control over short-term money market interest rates. To that end, it expanded the range of counterparties it interacts with, notably by increasing the importance of shadow banking actors (such as dealers and money market funds) and instruments (such as repurchase agreements) for the conduct of monetary policy. Curiously, the greater involvement of the Fed with shadow banking was not accompanied by a similar expansion of discount window access to these actors, as it instead relied on banks to act as an elastic private market backstop. As I show, the phasing in of the Basel III macroprudential reforms from 2015 onwards made this arrangement increasingly precarious as new regulations constrained banks’ ability to elastically expand their balance sheet at will. With banks’ intermediation capacity constrained, money market liquidity thus increasingly came to depend on the Federal Reserve and its positioning in relation to various money
market participants—a reliance that contradicted its effort to cleanly extricate itself from ‘efficient’ market processes.

Drawing on this contradiction, Chapter 6 discussed how these new arrangements constrained Fed policy in new and unexpected ways. Since the crisis, it has been characterised by a strong normative commitment to ‘normalise’ its balance sheet and monetary policy practices, by which Fed officials understood a return to the practices that prevailed during the Great Moderation. Its normative commitment to a small balance sheet and a small money market footprint however clashed with the institutional reconfiguration of markets in the post-crisis period: notably, the expansion of the Fed’s balance sheet and the provision of central bank liquidity to financial actors created important constituencies in favour of expanded access to liquidity, which proved difficult to unwind. Even more significantly, macroprudential reforms had capitalised on central banks’ large balance sheets by making the holdings of highly liquid assets a key plank of the new regulatory framework. In this context, the unwinding of the Fed’s balance sheet met unexpected difficulties. Empirically, the chapter traced the effects of its attempted policy normalisation across three interlinked money market segments: the FX swap market, the LIBOR market, and the domestic US repo market. As I have shown, funding pressures migrated from the outer spheres of global dollar markets into the very heart of the US financial system between 2015 and 2019, culminating in an acute repo funding crunch in September 2019. The reason for this development, I have suggested, was a clear lack of coordination between the imperatives of monetary policy, financial stability regulation, and the Treasury’s debt management practices, leading to a situation in which banks’ ability to serve as an elastic backstop for proliferating shadow banking actors and practices was progressively squeezed.

The lessons learned about market structure during this period of experimentation played a significant role in the Fed’s policy response to the Covid-19 shock in early 2020. Chapter 7 has described the Federal Reserve’s pandemic interventions in detail. In March 2020, it acted extremely quickly to compress credit spreads in short-term money markets, expanded the reach of its interventions into offshore dollar markets and, for the first time in almost a century, intervened directly in credit markets. By intervening with overwhelming force and across markets, the Fed blurred the lines between financial stability policy, monetary policy, and fiscal policy in the effort to
protect and de-risk private finance. When judged in terms of their ability to stabilise and backstop private finance, its interventions were indisputably a success. Yet the market turmoil and the policy response also show that a broader set of questions about the macrofinancial architecture of US finance remain essentially unanswered. Despite the experience of the previous years—notably the September 2019 repo funding crunch—US policymakers were taken by surprise by the intense volatility in the US Treasury market in early 2020. Even though the pro-cyclical tendencies of repo finance were well-known, policymakers had failed to draw lessons for the sovereign debt market they usually consider the ‘deepest and most liquid’ in the world. In a market-based financial system that is increasingly organised around secured short-term money market funding such as repo and FX swaps, the linkages between these funding instruments and collateral markets are only likely to increase. In stabilising and managing this system, the pandemic thus pushed the Fed more forcefully into a comprehensive de-risking role across the (financial) economy yet without addressing the underlying tensions within the financial market structure itself.

8.2. Contributions and future research avenues

Based on these findings, three avenues for future research are suggested that could be usefully explored further to gain a better understanding of the macrofinancial arrangements that characterise the (global) financial system: (i) the rise of secured, collateral-intensive finance; (ii) the geographical and geopolitical shifts in the dollar-based international monetary system; and (iii) the changing patterns of the de-risking logic that is increasingly shaping central banking and state policy more broadly.

8.2.1. The rise and rise of market-based finance

A key theme implicit within the thesis has been the growing importance of secured money markets and the analogous decline of unsecured money market lending. Secured lending and the use of collateral in money market transactions has been an important aspect of the marketisation of financial intermediation, a process better known as shadow banking or market-based finance. Political economy scholarship has
rightly pointed to the persistence of shadow banking as a key outcome of the global financial crisis. Even where global regulators initially intended to curb excessive volatility in shadow banking practices, political lobbying has prevented a broader repression of shadow banking practices (Ban et al., 2016; Helleiner, 2014; Pagliari & Young, 2016). As a result, policymakers have begun to advocate the expansion of shadow banking. Rebranded as 'market-based finance', shadow banking practices such as repo markets have been promoted by industry interests, but also by central bankers that rely on such markets to transmit policy signals (Braun & Gabor, 2020).

The thesis has described how changes in the Fed’s operating procedures and facilities have expanded the significance and modes of state support to secured lending market segments such as the repo market and the FX swap market. Going forward, the growth of secured lending raises important questions about the stability risks of such funding operations. Pozsar (2015) has done important work in mapping the connections that characterise repo-dealing in today’s market environment. As he describes, dealer-banks stand between large cash pools in search of safety (such as pension funds that invest in reverse repo via MMFs, as their asset holdings are too significant to find safety in traditional bank deposits) and various kinds of leveraged bond portfolios in search for yield (such as hedge funds that obtain cash via repo trades to invest in capital and derivative markets). The discussion in this thesis suggests the need to expand the analysis of the domestic dealer complex by incorporating similar funding dynamics that characterise the offshore dollar funding complex. As I have suggested, globally active investors—both foreign banks and non-banks—are becoming more integrated into the dynamics of dollar funding markets, and thereby shape monetary dynamics to an extent that increasingly requires the Federal Reserve to take their operations into account.

The recent growth of non-bank institutional capital in global dollar markets corresponds to what Shin (2013) has termed a shift away from the ‘first phase’ of global liquidity centred around cross-border banking flows from 2003 to 2008, and towards a ‘second phase’ focused on global bond markets, beginning from 2010. Attracted by higher interest rates in foreign jurisdictions, this institutional capital glut is dominated by buy-side investors who have expanded their foreign portfolios in a global search for yield that cannot be satisfied by depressed rates of return in domestic economies characterised by easy monetary policy. The associated shifts in the
composition of the global dollar system pose important questions about its macrofinancial architecture—more specifically, how modes of integration into dollar-denominated funding networks shape the costs and availability of dollar funding in disparate market segments.

As we have seen, volatility in collateral-intensive markets can induce the need for liquidation that impairs even otherwise highly liquid markets such as the US sovereign debt market. To prevent such a scenario and possible feedback effects on US markets, coordinated central bank interventions can become necessary to provide sufficient dollar liquidity to investors, either directly or via the banking system as intermediary. Making sense of offshore dollar funding chains—and increasingly, the way in which they impact not just non-bank financial actors but the operation of non-financial actors, for instance in global value and payment chains—constitutes an important field of inquiry for future research.

8.2.2. The institutional foundations of US dollar hegemony

The globalised nature of dollar funding markets also suggests the need to understand the institutional underpinnings of the dollar’s role in global markets more clearly. As the Fed’s interventions in March 2020 demonstrate, highly integrated global dollar markets require a globalised response to curtail volatility in key collateral markets and interest rates. The contemporary political economy literature has studied the US’s exorbitant privilege in international markets (Eichengreen, 2011), as well as questions of currency competition and currency internationalisation (Cohen, 2015, 2018). By contrast, the analysis advanced in this thesis suggests the need to understand more clearly not the conflict between states and their respective currencies, but to make sense of the way in which public authorities interact with private financial actors in international markets, and through what modes they institutionalise and safeguard the circulation of particular monetary claims such as repo or FX swaps.

A starting point for making sense of the changing shape of international dollar intermediation is the geographic shift in the dollar system away from the transatlantic axis that characterised the global financial crisis and towards a transpacific dimension. While the relationship between the US and Asia is typically framed in terms of a competition between the US and China—including questions about the sustainability
of the US deficit, or the implications of China’s FX reserves and currency internationalisation strategy (McDowell & Steinberg, 2017; McNally, 2012)—the analysis advanced in this thesis suggests the need for future research to look more closely at the role of private Asian financial actors. As the uptake of the Fed’s Covid swap lines suggests, acute dollar funding needs have migrated from Europe (with the ECB accessing about 80 percent of swap line lending during the global financial crisis) towards Asia (with the Bank of Japan accessing about 47 percent of swap lending in 2020). Notably, dollar funding needs of Asian financial actors were limited not to traditional banks but included large institutional investors such as life insurers or pension funds that had extended their reach into foreign investments in an intensified search for yields over the last decade.

The geographic shift from Europe to Asia as well as the institutional shift from banking to non-banking institutions raises important questions about the dynamics that underpin the US dollar-centric international system. Following the Covid-19 crisis, new institutional mechanisms are now in place to support the system: the availability of swap lines for a select group of counterparties under conditions of large-scale crisis has been reaffirmed, and the introduction of the FIMA repo facility offers additional access to US dollar liquidity for other public authorities. The institutional backstop structure can guide our understanding of hierarchy within the global dollar system. Modes of access matter not just during times of emergency as they tend to create stable expectations around pricing and availability for US dollar liquidity, which can influence investor behaviour even in more tranquil times and influence risk-taking capacity. As such, the Fed’s backstop arrangements can exert a powerful function in structuring markets and dollar availability, the consequences of which require careful ongoing study.

On a political level, the impact of backstop mechanisms is far less certain. While the Federal Reserve justified the creation of the FIMA repo facility in economic terms—i.e. as a question of suitable collateral—the facility undoubtedly helps avoid the politicisation that has accompanied swap line lending in the past. Whereas swap lines have been framed as a way to lend a ‘helping hand’ to friends and allies, the FIMA repo facility appears intended for those countries with large FX reserve holdings, growing dollar exposures and strained political ties to the US—most notably, China. Yet as the Federal Reserve interacts more with countries outside of its swap network,
a key question is how these lending operations will impact on US foreign policy. Does dollar lending offer the US some political space to make demands on foreign counterparties? Can the Federal Reserve afford to withhold lending during a severe crisis? Here, the experience of the global financial crisis suggests that the Fed has rather limited policy space: lending to the ECB was not tied to any specific conditions or concessions, which is notable as swap lending during the Euro crisis coincided with debates over international financial regulation (Hardie & Thompson, 2020). Questions about implicit conditionality and associated questions of monetary power are likely to become more significant as the Fed interacts more with East Asian economies, which are shaped by different investment rules and practices, and located outside of the traditional transatlantic geopolitical sphere of influence.

8.2.3. The emergence of the de-risking state

The growing involvement of the Federal Reserve in domestic and global markets and the political and policy trade-offs such activity generates has increased interest in the backstopping role that central banks assume. This thesis has focused on this de-risking behaviour by highlighting the role of the central bank in the organisation of liquidity within money markets. The need for supporting liquidity on a more systemic basis has become clear with the global financial crisis, which demonstrated that funding and market liquidity are closely intertwined and could interact in collateral-intensive financial markets. Since then, as argued in this thesis, liquidity has become a systemic imperative that has shaped monetary governance on a consistent basis.

Throughout the 2010s, the Fed has arguably struggled to adequately account for its systematic involvement in the organisation of liquidity. We can see this most clearly with regard to the Fed’s backstopping facilities: whereas the Federal Reserve responded to the global financial crisis by intervening as a ‘market maker of last resort’, stabilising both funding conditions and collateral values, the Fed has been unwilling to enshrine a backstop commitment to shadow banking actors on a permanent basis in the post-crisis period. Given the Fed’s increased balance sheet and the ample reserves environment that banks found themselves in after three rounds of Quantitative Easing, Fed officials might have considered such a backstop facility unnecessary: the highly liquid banking system could function as an effective private
market backstop for shadow banking actors when necessary, allowing the Fed itself to retain a level of distance from such actors.

Somewhat ironically, this modus operandum was put into question by the Fed’s efforts to ‘normalise’ its balance sheet: the run-down of reserve positions, coupled with the introduction of less permissive regulatory standards, increasingly limited the ability of banks to act as an elastic private sector backstop. As the Fed was seeking to normalise its monetary policy conduct, the lack of elasticity within money markets manifested itself in a series of funding pressures that progressively migrated from the outer edges (the FX swap market) into the very heart of the US financial system (the domestic repo market). The disconnect between the monetary policy imperative of normalisation and the need for new financial stability mechanisms to accommodate such practices came to the fore in September 2019, when repo rates spiked suddenly and dramatically amidst a broader funding squeeze across core money market segments. The September 2019 repo spike convinced Fed policymakers that a transformation of the macrofinancial architecture—such as the introduction of a standing repo facility—was necessary to support the realignment of macroeconomic governance practices with the pre-crisis consensus. As Fed staff started designing such a repo facility, the onset of the Covid-19 pandemic once more shifted the macrofinancial landscape. Large-scale interventions on the part of the Fed made any return to a small balance sheet redundant for the time being.

Overall, the idea of a ‘de-risking state’ thus neatly summarises the growing role of central banks in propping up unstable financial structures. The pandemic interventions and their aftermath enshrined the idea, already articulated in the wake of the global financial crisis, that we are in an age of ‘central bank-led capitalism’ (Bowman et al., 2012). Yet as central banks’ de-risking role becomes more prominent and given that major socio-economic and environmental challenges loom over today’s policy debates, a key question will be what central banks can do and ought to do to influence the investment decisions of private financial actors. One aspect of this concerns the conditions under which central banks grant non-bank actors access to its discount window facilities: the Fed’s new repo facility, for instance, comes with minimal conditions. Such a laissez-faire approach does not sit well with the lessons of the 2010s that showed how, with the introduction of macroprudential rules, central bankers and regulators could become much more proactive in restructuring and redesigning the
balance sheet operations of private finance. Doing so would open up new possibilities for directing credit flows more clearly in line with social and ecological prerogatives. Here, incipient changes seen over the last decade are far from sufficient: to make central bank and broader state policy fit for steering capital in a green transition would require nothing short of a broader reorganisation of monetary-fiscal-financial policies.

As this thesis has shown, the existing division of labour tends to lead policymakers to ignore and externalise complex interconnected problems in the governance of markets, rather than reorganise governance domains and acknowledge the need for monetary-fiscal coordination, especially if doing so could carry legitimacy costs. In lieu of such changes, de-risking interventions lack strategic purpose: while the Fed’s credit market interventions during 2020 arguably came close to credit allocation schemes, the Fed eschewed any discussion of broader questions about the (social) purpose and direction of de-risking interventions. As critics have charged, the result has been to provide funds indiscriminately to wealth holders and fossil fuel interests (Brenner, 2020; Guida & Colman, 2020).

By late 2022, as inflation rates across advanced economies are nearing double digits, the return of traditional macroeconomic concerns pose further questions about how central banks will respond to their diverse and conflicting interests and constituencies. It is certainly not a coincidence that the expansion of the de-risking macrofinancial architecture coincided with a period of low inflation of the 2010s, when economic stagnation was coupled with dramatic asset price increases. Tighter monetary conditions imposed to bring down inflation could cast doubt on asset prices that were priced under the assumption of persistently low real interest rates and ample central bank liquidity support. Under such conditions, the changing modalities of the de-risking state, and the increasingly complex trade-offs that central banks and other public actors will confront, should be a key concern of the political economy literature on money and finance in years to come.
Appendix – List of Interviews

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