# The Fall Potential Output due to the Financial Crisis: a Much Bigger Estimate for the UK

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**Abstract**

Conventional estimates suggest that the 2007-9 financial crisis reduced UK potential output by 3.8 to 7.5 per cent of GDP. This implied a need for fiscal tightening as the structural budget deficit had increased considerably. The austerity that followed led to the rise of UKIP, the EU referendum and the vote for Brexit. Brexit will reduce potential output by somewhere between 3.9 and 8.7 per cent of GDP. Thus, it can be argued that the total fall in UK potential output due to the banking crisis is between 7.7 and 16.2 per cent of GDP - approximately double the conventional estimate.

Keywords: austerity, Brexit, financial crisis, potential output.

JEL Classification: F15, G01, H12, O47.

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## I. Introduction

Economists generally believe that both the banking crisis of ten years ago and the impending Brexit will damage the UK's productive capacity relative to the counterfactual that neither happened. These shocks are analysed as unfortunate but separate events. This paper argues that far from being unrelated the banking crisis and Brexit are intimately connected with the fiscal costs of the former precipitating the vote in favour of the latter. If this claim is accepted, it is reasonable to suppose that the total impact of the financial crisis on potential output is of the order of twice the conventional estimate.

It is widely accepted that banking crises have a lasting negative impact on the level of GDP that the economy can produce at full capacity, i.e., on potential output. This effect comes through decreases in capital, human capital and total factor productivity. A conventional estimate might be that the crisis of ten years ago probably reduced the level of potential output in the UK by somewhere between 3.8 and 7.5 per cent. This would account for part, but by no means all, of the 'productivity puzzle'.

There are typically severe fiscal implications of a banking crisis which will be reflected in a significant rise in the structural budget deficit and in the public debt to GDP ratio; by 2010 the UK was in just this position. Damage will be done in the short term by the impact of recession on the public finances and by the costs of rescuing the banks, and in the long term by lower tax revenue consequent on the fall in productive potential. A period of painful fiscal consolidation ('austerity') will typically be required to restore fiscal sustainability.

Prolonged austerity is likely to have political ramifications. Losers can be expected to protest. After the UK fiscal squeeze began in 2010 it seems that a large part of the protest vote went to UKIP and then continued into voting Leave in the EU referendum in June 2016. Without this protest vote, Leave would not have won and without the surge in support for UKIP there would not have been a referendum. So Brexit can be seen as a consequence of the fiscal costs of the financial crisis.

There is a near consensus that Brexit will adversely affect the level of potential output compared with the counterfactual of remaining in the EU. The size of this effect depends on the type of Brexit that takes place and is quite difficult to estimate. That said, the mainstream literature suggests that it could easily be of a similar magnitude to the impact of the banking crisis, perhaps within the range 3.9 to 8.7 percent of GDP. If it seems reasonable to see Brexit as an outcome of the financial crisis, then the total (direct and indirect) loss in the level of potential output from that crisis would be between 7.7 and 16.2 per cent of GDP.

This argument is developed in the paper, as follows. In section II, the direct effect of the banking crisis on potential output is quantified using the best available estimates from the literature. In section III, the fiscal consequences of the crisis as seen at the time and the associated changes in fiscal policy compared with pre-crisis expectations are reviewed. The case for considering post-crisis austerity as a crucial factor in the victory of Leave in the EU referendum is developed in section IV. Estimates of the impact of Brexit on the level of potential output are discussed in section V. Section VI concludes.

## II. Estimates of the Impact of the Banking Crisis on UK Potential Output

It is well-known that banking crises have significant costs in terms of reductions in GDP. A substantial literature has developed which seeks to quantify these output losses based on a variety of methods and criteria. Important recent contributions include Reinhart and Rogoff (2014) who examine 63 crises in advanced countries between 1857 and 2013 and find a median fall in real GDP per person of 7.1 per cent from peak to trough (UK post 2008 = 8.0 per cent) with a median of 6.0 years before previous peak real GDP per person is reached (UK post 2008 = 7.75 years). Also noteworthy is the work of Romer and Romer (2017) whose database is 24 OECD countries from 1967 to 2012. They calculate an index of financial distress (on a scale of 1-15) and present estimates for an episode with an intensity of 7 (UK reached 10 in 2008) which they find has a maximum impact on real GDP of 6 per cent after 3.5 years with a cumulative loss of GDP of about 15 per cent over the first 4 years. Leaven and Valencia (2018) is a very useful paper which reviews the output losses in high-income countries for crises occurring between 1970 and 2017. These are measured as the cumulative sum of differences between actual and trend GDP over 4 years from the start of the crisis. They estimate that the median loss is 34.95 per cent of trend GDP (25.3 per cent for UK in 2007-11).

It is important to recognise that output losses from banking crises typically have both a transitory and a permanent component. The former can be thought of as the short-term costs of recession, credit interruption etc. The latter result on the supply-side through long-term damage to productive potential as the level of output is shifted down from its previous trend growth line. Of course, a similar distinction can be made with regard to the impact of Brexit. In the short term, output may be lowered as a result of uncertainty undermining demand or by the disruption of a disorderly Brexit. In the longer term, productivity will be reduced relative to the counterfactual of staying in as trade costs increase and trade volumes fall.

This paper considers only the long-term impacts on potential output of the banking crisis and Brexit and disregards the short-term costs of recession and disruption. This is partly for practical reasons; the transitory impact of Brexit is not yet known and the short-term costs of the banking crisis are difficult to ascertain at this point. Also, however, it is very likely that the impacts of the two shocks on potential output in the long term are by far the more important. For example, suppose we take the 25 per cent cumulative output loss estimated by Laeven and Valencia (2018) as the transitory component and a permanent impact of 3.8 per cent on productive potential, i.e., in every future year GDP is 3.8 percent lower than in the counterfactual case of no crisis. Evaluated over 20 years from t + 5 to t + 25 and assuming 2 per cent year trend growth the loss adds up to 92 per cent of initial GDP or a present value of 56 per cent of GDP at a discount rate of 3.5 per cent. If the permanent impact on potential output is 7.5 per cent, these amounts become 182 and 110 per cent of initial GDP, respectively.

Banking crises can be expected to have an adverse impact on productive capacity such that the level of potential output is permanently reduced compared with a business-as-usual counterfactual. Thinking in terms of a production function or growth accounting, there may be direct adverse effects on capital inputs as investment is interrupted, on human capital if skills are lost or restructuring makes them redundant, on labour inputs through increases in equilibrium unemployment, and on

TFP if R & D is cut back or innovative firms cannot get finance. It is, of course, possible that the trend rate of growth is adversely affected but the general assumption is that this is not the case.[1]

In Table 1 several estimates of the impact of the banking crisis on the level of potential output are reported.[2] The papers by Furceri and Mourougane (2012) and by Oulton and Sebastia-Barriel (2017) contain econometric estimates of the average effect of past banking crises. The number in the table from the former authors is for a 'severe crisis' in an OECD country while that from the latter is derived from their estimate that the level of potential GDP per capita is reduced by 1.8 per cent for each year that the crisis lasts.

The papers by Dicks (2010) and by Ollivaud and Turner (2015) relate specifically to the UK. Dicks based his estimate on research by the IMF which tried to identify the circumstances in which a banking crisis would have a relatively large effect. He developed a scorecard which suggested that the UK would experience an above average hit. Ollivaud and Turner obtain their estimate by comparing potential output in 2014 with what would have been expected on the pre-crisis trend in labour productivity with some adjustments to allow for factors affecting equilibrium employment. Their approach takes account of a marked slowing in trend labour productivity growth prior to the crisis but is probably an upper bound since factors other than the banking crisis may have played a part.[3]

The range of the estimates in Table 1 is from 3.8 to 7.5 per cent of GDP. Each of them has to be viewed with some caution but nevertheless they probably represent the best guesses that can be taken from recent research. As will be seen in the next section, the fiscal response to the crisis made similar assumptions.

## III. Fiscal Implications of the UK Banking Crisis

If the level of potential output falls and in future will be permanently lower than previously expected, then the structural budget deficit as a share of GDP increases because tax revenues will be lower and government outlays will be higher. In the UK case, the structural budget deficit probably increased as a percentage of GDP by slightly more than the level of potential output fell as a result of the banking crisis. In the absence of a policy response, public borrowing will rise permanently relative to GDP and this may imply a loss of fiscal sustainability with the public debt to GDP ratio rising steadily over time.

This analysis was echoed in the 2010 IFS Green Budget in which it was suggested that the post-crisis increase in the structural budget deficit might be around 7 per cent of GDP and a projection of the

[1] See, for example, OECD (2012) which gives projections for post-crisis growth in OECD economies. The assumption explicitly stated was that the crisis would reduce the level of potential output by 2.5 per cent on average but have no effect on the post-crisis trend rate of growth.

[2] It should be noted that these are comparisons based on a zero output gap in each case. These do not include the actual GDP losses which accrue during the post-crisis recession before the output gap is closed.

[3] In a companion paper, it is reported that trend productivity growth estimated using an HP-filter method was only 0.7 per cent in 2007 compared with 2.1 per cent in 2000 (Ollivaud et al., 2016). Discussions of the 'productivity puzzle', for example by ONS (2018), typically measure the shortfall in actual labour productivity compared with an assumption that pre-crisis trend productivity growth was around 2 per cent per year. In any case, the levels adjustment in potential output may be a contributing factor to this puzzle but is far from a complete explanation.

public debt to GDP ratio in the absence of policy action showed it increasing from below 40 per cent pre-crisis to 120 per cent in the mid-2020s and 160 per cent by 2040 (Chote et al., 2010).[4] HM Treasury accepted that the structural budget deficit had increased markedly and that there was a need for fiscal tightening, as is reported in Table 2. Both the outgoing Labour government and the incoming Coalition government accepted the case for serious fiscal consolidation to maintain fiscal sustainability although the parties differed somewhat on its composition, size and timing.

Austerity was a bi-partisan policy response to the fiscal implications of the banking crisis without which it would not have been instigated by either party. In the event, the austerity programme relied very heavily on cuts to public expenditure which comprised 89 per cent of the fiscal consolidation. In turn, a substantial part of these cuts were implemented through reductions in grants to local authorities which fell by 36.3 per cent on average between 2009/10 and 2015/16. Across local authorities the reductions in public spending per person ranged from 46.3 to 6.2 per cent with the most deprived areas experiencing relatively large cuts (Innes and Tetlow, 2015).

## IV. Austerity and Votes for Leave

The context for the referendum vote was as follows. First, it should be noted that the UK has traditionally been a relatively Eurosceptic country and that Britons have a comparatively weak sense of European identity (Carl et al., 2019). Second, there are very clear demographic and educational patterns in the propensity to vote Leave which was correlated at the district level with the proportions of old and less educated people (Becker et al., 2017). Similarly, and closely associated with these patterns, 'authoritarian' were more likely than 'libertarian' voters to be pro-Brexit (Norris and Inglehart, 2019). Third, globalization nurtured Euroscepticism as both import competition from China and immigration from the EU Accession countries were correlated with Leave's vote share at the district level (Colantone and Stanig, 2018; Goodwin and Milazzo, 2017) although neither was a new phenomenon in the years before the referendum. Fourth, while these factors implied a deep reservoir of support for Leave, they were not sufficient to win the referendum. The Eurobarometer share of respondents saying that EU membership was a bad thing varied between 23 and 38 per cent from 2000 to the referendum while the opinion polls show that Remain was clearly ahead in early 2015 (Alabrese and Fetzer, 2018).

The announcement that there would be a referendum on EU membership if the Conservatives won the 2015 General Election was made in January 2013. It was a response to the perceived threat posed by UKIP to the Conservatives that by taking votes disproportionately from them rather than Labour or the Liberal Democrats a significant number of their seats would be lost. At the time, almost 20 per cent of those who had voted Conservative in 2010 were supporting UKIP and over 60 per cent of UKIP supporters had voted Conservative in 2010 (Clarke et al., 2017). A survey of Conservative Party members revealed that 58 per cent were possible or likely UKIP voters (Webb and Bale, 2014).

The starting point for an analysis that links austerity to voting for Leave in the referendum is the observation that across districts the vote share for Leave is closely correlated with the share of the vote for UKIP in the 2014 European elections. A simple regression line has an intercept of about 25

[4] The Institute for Fiscal Studies is a highly respected think tank which produces an authoritative analysis of the UK fiscal situation every year in its 'Green Budget'.

per cent and a slope close to 1 with an $R^2$ of 0.75 (Becker et al., 2017). This suggests that an investigation of the growth in support for UKIP over time might be instructive not only in explaining why there was a referendum but also why Leave won.

The rise of populist-right parties like UKIP is often theorized to come either from grievances about economic marginalization and immigration or from disillusionment with the performance and policies of mainstream political parties (Clarke et al., 2017). The analysis in Fetzer (2018) neatly combines these claims by finding that the latter interacted with the former. He notes that, after flat-lining for some years, support for UKIP in local council elections rose strongly after 2010 in areas with weak socio-economic fundamentals. His pooled difference-in-differences analysis of UKIP's vote share in elections between 2000 and 2015 shows a strong impact from post-2010 local austerity which hit deprived areas with high receipts of benefits relatively hard. It appears that austerity-induced welfare reforms activated economic grievances. When the analysis is repeated using year fixed effects the impact of austerity rises steeply between 2011 and 2015. The effects are sizeable: for a district experiencing the average austerity shock UKIP's vote share would rise by 3.58 percentage points based on the pooled estimate and 11.51 percentage points based on the estimate for 2015. Given the tight relationship between the vote shares of UKIP and Leave, these results suggest that Remain would probably have won in the absence of austerity.[5]

This inference is strengthened by two further findings. First, similar results for the impact of local austerity are found for an individual-level analysis of support for UKIP based on survey data; also 87 per cent of the individuals who expressed support for UKIP in the most recent survey before the referendum would support Leave (Fetzer, 2018). Second, a recent opinion poll with a large (20,000) sample shows a significant swing from Leave to Remain (6.3 percentage points) since the referendum. The single most important correlate of geographic variation in this swing away from Leave is exposure to austerity post 2010 (Alabrese and Fetzer, 2018). This suggests that marginal Leave supporters in 2016 were protest voters motivated by austerity rather than committed Eurosceptics.[6]

Further support for the hypothesis that austerity was a key factor for the marginal voters, who augmented the committed Eurosceptics to deliver a victory for Leave, can be found in the analysis of district-level voting by Becker et al. (2017). This is summarized in Table 4. The results reported there suggest that Leave's vote share was quite sensitive to austerity such that a relatively modest reduction in fiscal cuts might have been enough for Remain to win. The table also points to variables which were moving in a pro-Remain direction (educational qualifications, unemployment) and shows that slow-moving changes in age structure are unlikely to have delivered the surge in support for Leave even though elderly voters were prominent in the core Eurosceptic vote.

Clearly, in principle, fiscal consolidation could have been designed differently; for example, increased taxation could have played a much bigger part. Also, the Conservatives winning a majority in 2015 as fiscal consolidation was still ongoing was something of a surprise. As it turned out, however, the

[5] Table 3 shows that the 20 districts most affected by cuts in tax credits generally gave big support to Leave – more than 60% vote shares in 15 of the 20. Tax credits are a benefit that matters a lot to areas with weak socio-economic fundamentals. This illustrates Fetzer's argument.

[6] The authors conjecture that the swing back to Remain may be stimulated by increased awareness of possible negative consequences of Brexit.

sequence of events seems clear – the financial crisis led to an austerity programme which boosted support for UKIP enough to make the Conservatives promise a referendum and antagonized left-behind voters whose protest votes were enough to tip the balance for Leave. So, Brexit is a legacy of the banking crisis although it was not an inevitable consequence.

## V. Mainstream Estimates of the Effect of Brexit on Potential Output

The general assumption in studies of the economic impact of Brexit is that it will entail an increase in trade costs for the UK. In turn, this will imply a reduction in trade volumes and, accordingly, an adverse impact on the level of productivity and thus on the level of GDP relative to the counterfactual of staying in the EU.[7] The magnitudes of these effects depend on the details of the new trading arrangements that are assumed to supersede EU membership and on model specifications. A 'soft Brexit', for example, the UK leaving the EU but staying in the European Economic Area would be expected to have a smaller negative effect than a 'hard Brexit', for example leaving without a deal and trading on a WTO-rules basis.

Three caveats should be borne in mind when considering the estimates in Table 5. First, a standard way to estimate the impact on trade volumes is to use a gravity model and to compare trade flows between pairs of countries which are EU members and pairs which are non-members. This method does not allow separate estimates for an ex EU member so, strictly speaking the impact on trade of leaving the EU is not known. Second, no allowance is made for the effects of post-Brexit reforms to supply-side policies once freed from the constraints of EU membership. The direction of any such effect is not clear but might even be to exacerbate the output losses from Brexit by facilitating a return to the damaging interventionist policies of the 1970s (Crafts, 2018).[8] Third, of course, many permutations of the design of a trade agreement are possible so the range of estimates in column (2) is perhaps too narrow.

Membership of the EEA seems unlikely with the present government under Prime Minister May. In that case, the TA and WTO columns of Table 5 can be seen as representative of mainstream estimates of the impact of Brexit on the level of UK potential output when adjustment is complete perhaps after 10 years or so. The range is from -3.9 to -8.7 per cent of GDP.

This implies that a new structural budget deficit would emerge even allowing for the ending of the UK's net budgetary contribution to the EU. Based on the arithmetic in Emmerson et al. (2016) this would amount to about 5.7 per cent of GDP if a hard (WTO) Brexit reduced potential GDP by 8.7 per cent.[9] This would bring a whole new dimension to the concept of 'self-defeating austerity'. A quest

[7] These are the assumptions made by the vast majority of studies. Erken et al. (2018) argue that Brexit would reduce the rate of growth (rather than the level) of GDP by 0.8 per cent per year and thus have a much bigger long run impact. Minford (2015) predicts a positive impact on GDP largely because Brexit will mean escaping onerous future regulation which would lower GDP substantially if the UK stayed in. I disregard both these estimates.

[8] The obstacles to much-needed reforms of supply-side policy are to be found in domestic politics not constraints imposed by EU membership (Crafts, 2018). For a similar view, see Porter (2018).

[9] Emmerson et al. (2016) estimated that a decline of 1 per cent in GDP due to Brexit would increase new public sector borrowing by 0.7 per cent of GDP and that a reduction of 0.6 per cent in GDP would approximately cancel out the improvement in the public finances from ending the UK's net budgetary contribution. So, the net effect of 'hard Brexit' would be (8.7 – 0.6) x 0.7 = 5.67 per cent of GDP.

to eliminate a structural deficit estimated by HM Treasury at around 5 per cent of GDP in 2010 would have given rise to an even bigger one down the line.

## VI. Conclusions

The 2007-9 banking crisis had an adverse impact on the level of UK potential output. A survey of the literature suggests that the magnitude was probably in the range 3.8 to 7.5 per cent of GDP. Brexit is also generally predicted to have a negative effect on the level of potential output relative to the counterfactual of staying in the EU. Here the impact will depend on the details of new trade arrangements with a trade agreement expected to be less damaging than a hard Brexit. The range suggested in the literature is from 3.9 to 6.2 per cent of GDP for the former and from 5.5 to 8.7 per cent of GDP for the latter.

These two misfortunes are usually seen as unrelated. In fact, there is a close connection between them which runs through the fiscal consolidation that had to be undertaken in the wake of the financial crisis. The pain of austerity promoted the rise of UKIP, a referendum on EU membership, and a win for Leave. None of these outcomes was by any means certain ex ante but they were the realised results of the policy response to the banking crisis. If Brexit is seen as an outcome of the banking crisis, then the total loss of potential output from that debacle is approximately doubled and lies in the range 7.7 to 16.2 per cent of GDP.

The implication is that, if the risks of unfortunate policy responses following a crisis are taken into account, there are even stronger reasons to regulate the banking system strictly, in particular to ensure that it has adequate levels of loss absorbing equity capital. Miles et al. (2013) show that the social benefit-cost ratio of reducing leverage substantially is high in any case. The events of the last 10 years indicate that it is even higher than they thought.

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**Table 1. Estimates of the Impact of the Banking Crisis on the Level of UK Potential Output (%GDP)**

| | |
|---|---|
| Furceri & Mourougane (2012) | -3.8 |
| Oulton & Sebastia-Barriel (2017) | -5.4 |
| Ollivaud & Turner (2015) | -6.9 |
| Dicks (2010) | -7.5 |

*Sources*: see text.

**Table 2. Fiscal Implications of the Banking Crisis (%GDP)**

| | Increase in Structural Deficit since Pre-Crisis | Planned Fiscal Tightening |
|---|---|---|
| March 2010 Budget | 5.7 | 5.8 (by 2016/17) |
| November 2010 Autumn Statement | 6.0 | 7.0 (by 2015/16) |
| December 2014 Autumn Statement | 8.4 | 10.7 (by 2019/20) |

*Source*: Emmerson and Tetlow (2015)

**Table 3. Districts Which Experienced Largest Cuts in Tax Credits per Person**

| Districts | Leave Vote (%) |
|---|---|
| Blackpool | 67.46 |
| Blackburn with Darwen | 56.34 |
| Barking and Dagenham | 62.44 |
| Peterborough | 60.89 |
| Bradford | 54.23 |
| Burnley | 66.61 |
| Knowsley | 51.56 |
| Sandwell | 66.72 |
| Oldham | 60.86 |
| Hull | 67.62 |
| Pendle | 63.15 |
| Thanet | 63.85 |
| Middlesbrough | 65.48 |
| Leicester | 48.92 |
| Boston | 75.56 |
| Birmingham | 50.42 |
| Hyndburn | 66.19 |
| Rochdale | 60.07 |
| Corby | 64.25 |
| Stoke-on-Trent | 69.36 |

*Note*: districts are listed in rank order of cuts. Tax credits are an important part of total cuts and are strongly associated with weak fundamentals.

*Source*: Beatty and Fothergill (2016)

**Table 4. Reversing the Referendum Result**

| | Actual | To Reverse |
|---|---|---|
| Population Share Aged ≥ 60 (%) | 24.0 | 3.2 |
| Unemployment Rate (%) | 5.3 | 0.5 |
| Fiscal Cuts/ Person (£) | 448 | 407 |
| Population Share with No Qualifications (%) | 35.4 | 33.4 |
| EU-Accession Migrant Growth Rate, 2001-2011 (%) | 1.7 | -0.6 |
| Manufacturing Employment (%) | 15.1 | 12.6 |

*Note*: 'To Reverse' is the value of the variable based on regression analysis that would give 'Remain' 50.01 per cent of the vote holding all other variables constant.

*Source*: Becker et al. (2017)

**Table 5. Estimates of the Long-Term Impact of Brexit on the Level of UK Potential Output (%GDP)**

| | WTO | TA | EEA |
|---|---|---|---|
| Ebell and Warren (2016) | -7.8 | | |
| Hantzsche et al. (2018) | -5.5 | -3.9 | |
| Levell et al. (2018) | -8.1 | -4.9 | |
| Rojas-Ramagosa (2016) | -8.7 | -5.9 | |
| | | | |
| HM Treasury (2016) | -7.5 | -6.2 | -3.8 |
| HM Government (2018) | -7.6 | -4.9 | -1.4 |

*Note*: all estimates include long-term impact on level of productivity but do not take account of any impact from migration.

*Sources*: as listed above.