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**Using Signals to Reduce Adverse Selection and
Formulate Seller Positioning Strategies in Informal
Markets**

BY

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A thesis submitted in partial fulfilment of the
requirements for the degree of
Doctor of Philosophy in Business and Management

University of Warwick, Warwick Business School

December 2021

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List of Abbreviations

Abbreviation	Meaning
PUP	Price Unfairness Perceptions: Extent to which buyers believe that a seller is charging unfair prices.
PPS	Perceived Purchase Safety: Extent to which buyers believe that sellers are credible and reliable.
PR Signals	Power & Resource Signals: Signals which showcase power and resources
EB Signals	Emotions & Benevolence Signals: Signals which showcase emotions and benevolence

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ACKNOWLEDGEMENTS

I cannot express enough thanks to Prof. Nick Lee and Prof. Magda Hassan for their unending support, patience, and encouragement. The completion of this project was not possible without their support. Their invaluable insights – whether in formulating theories or in addressing complex research issues – were instrumental in bringing this project to fruition.

I would also like to express my special thanks to Prof. John Rudd, and Prof. Yansong Hu for their thoughtful comments and insights which strengthened the utility of this study. Lastly, I would like to express my gratitude to the University of Warwick, not only for providing an excellent learning opportunity but also for generously funding the data collection efforts for this study.

DECLARATION

I declare that this thesis was composed by myself, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted for any other degree or professional qualification. No part of this work has been published.

ABSTRACT

Informal markets suffer from adverse selection. This problem is further compounded by the power and resource inequalities of the people who participate in these markets. In such markets, sellers face the dual challenge of reducing adverse selection and adopting positioning strategies that communicate their unique social positions. To understand how informal market sellers can resolve adverse selection and adopt unique positioning strategies, the study determines the impact of signals on three outcomes – increasing reliability/credibility, reducing price unfairness perceptions, and increasing price. First, a novel framework is developed that shows how word of mouth as the propagation medium is key in sustaining certain signals, while signals that require alternative propagation mediums do not function. Afterward, the study identifies both existing signals and contributes new signals - consistent selling locations, investments in product care, and percentage of credit offered - that can be sustained in informal markets, and shows how sellers with different resource levels can use separate signaling strategies to reduce adverse selection and uniquely position themselves compared to the competition. While high-resource sellers can signal using their financial resources and avoid threats of social isolation, low-resource sellers must signal using their social/personal reputation and thus risk social isolation if product quality is not as expected. Field study results show little buyer confidence in products exchanged, negative bias against low-resource sellers, and widespread use of pseudo-signals. Furthermore, optimal signaling strategies are devised that help sellers achieve the three key outcomes while overcoming differential impact of signals across outcomes. For low-resource sellers, the optimal signaling strategy is to offer a percentage of credit, while high-resource sellers should use calves attached, LPGs, fodder fed, and consistent locations. Lastly, the utility of the results in reducing reliance on pseudo-signals, increasing fairness for low-resource sellers, improving buyer confidence, and creating market interventions is discussed.

Chapter 1: Introduction

Informal markets¹ fulfill the needs of more than 4 billion of the poorest people on earth, with many surviving on less than 1\$ a day (Prahalad and Hart 2002; Prahalad 2006). Despite the importance of informal markets in fulfilling the needs of such a vast population, informal markets face numerous challenges, such as poor communication, inefficient and costly transportation, and lack of legal protection (Sheth 2011). Informal markets are remarkably heterogeneous, ranging from geographically dispersed and isolated villages to urban slums and shantytowns with varying consumer cultures and needs (Sheth 2011). The incredible heterogeneity of informal markets creates unsustainably high distribution and marketing costs for large companies (Karnani 2007), adding to the pre-existing challenges posed by poor communication, costly transportation, and lack of legal protection. Challenges of informal markets are further aggravated by their typical outlook: informal markets are plagued by the prevalence of illegal/unrecorded activities, unregistered/unregulated jobs, high tax evasion, and cash-based transactions. Despite challenges that plague informal markets, informal markets address the needs of around 40%-50% of the consumers in emerging economies and low-income countries (Sheth 2011). For some countries, such as Azerbaijan, Ukraine, Bolivia, Peru, Thailand, and Nigeria, informal markets produce half the GDP (Neuwirth 2012). On the producer side, informal markets employ around 1.8 billion people globally.

Unfortunately, informal markets are also dominated by another challenge: resource inequality. The prevalence of resource inequalities has created a niche class of privileged and powerful people, who exercise authority over lower resource sellers and continue to gain undue advantages (Khandan 2017). Due to their privileged position in society, powerful people create strong linkages within the state (e.g., police, courts, regulatory authorities), allowing

¹ Bottom of the Pyramid Markets and Informal Markets are used interchangeably since they are similar in principle but used with different terminology

powerful people to gain undue personal and business advantages at the expense of the wider population (Khare and Varman 2016). Since powerful people control the levers of power within informal markets, it becomes necessary for poorer sellers and common people to maintain ties with powerful people, resulting in less drastic social and business consequences when powerful people engage in faulty business practices. On the contrary, less powerful, and less resourceful sellers face more drastic consequences if they engage in faulty business practices (to be discussed later), creating unique challenges for sellers with different resource levels in informal markets.

In addition to the unique challenges created by different resource levels in informal markets, other factors differentiate informal markets from markets that typically operate in developed economies. For instance, illegal/unregistered activities are not only common in informal markets but are overlooked by legislators for fear of civil unrest if illegal/unregistered activities are curtailed (Polese et al 2017). Additionally, the absence of governments with strong executive powers in informal markets also creates difficulties in regulating illegal or unregistered activities. The absence of strong governments in informal markets also sets the stage for the biggest impediment to sustainable growth: information poverty (Prahalad and Hart 2002).

Information poverty is primarily caused by the absence of interconnectedness between informal markets' actors, other markets, and the outside world, when basic facilities, like telephones or the internet, are absent. The absence of these basic facilities can prevent critical microenterprise development activities, such as tele-education, micro-banking, and access to agricultural services (Prahalad and Hart 2002). The lack of basic facilities can also make it extremely difficult for buyers in informal markets to discover new sellers or learn about new products. Although the inability to communicate with outside markets might seem a trivial issue, it can generate a more severe problem: *information asymmetry*.

Information asymmetry presents a situation where true product quality is unobservable during a transaction. While sellers are aware of true product quality during a transaction, buyers can only learn

about true product quality post-purchase (Heide 2003). In situations with information asymmetry, sellers can mislead buyers by declaring a products' quality to be higher than its actual quality. Due to the absence of governmental help or legal aid in informal markets, buyers must endure the entire risk of the purchase, leading to severe financial losses and lower family welfare (e.g., less money for nutrition or education).

Although information asymmetry can be detrimental to informal markets, the various types of information asymmetries and their applications in informal markets must be elaborated first. Information asymmetry can be classified into two categories: (1) *adverse selection* (*seller is not able to change the quality from one unit to next*) and (2) *moral hazard* (*seller can change the quality from one unit to next*). In informal markets, the sellers' ability to conceal product quality forces buyers to infer product quality from seller-provided information, creating adverse selection issues (Heide 2003). Both information asymmetry types will be discussed in detail later. In brief, adverse selection arises in informal markets when sellers can conceal true product quality and deceive the buyers.

The presence of adverse selection can create a market imperfection that can lead to market failure (Akerlof 1970). This occurs when over repeated interactions with sellers, buyers are unable to differentiate between sellers with different product quality levels, paying sellers of different quality levels the same levels of money. As a result, high-quality sellers lose incentives to provide products with higher quality, eventually disincentivizing high-quality sellers and forcing them to exit the market. The remaining low-quality sellers further shatter buyer confidence, decreasing product demand, causing potential market failure.

A practical example of how adverse selection can have a devastating impact in informal markets can be derived from Pakistan. A typical Pakistani family owns a very small number of cows/buffalos: 95% of the families own less than 6 cows/buffalos, reflecting very low-overall incomes (Rehman et al 2017). The marginal impact of having a cow/buffalo of poorer quality than expected can be negative and

devastating. Apart from overpaying for lower-than-expected quality, financial losses occur when the cow/buffalo provides lower-than-expected milk quantity, substantially damaging family income. The decreased family income hurts family welfare by lowering resources for education or nutrition etc. The lower family income and loss of growth opportunities (e.g., through less education) will further aggravate resource inequality. Thus, for a country where vast populations are engaged in the livestock sector with milk being the most important commodity - such as Pakistan where more than 20% of the population (more than 30 million people) is engaged in the livestock sector - adverse selection can have drastic consequences.

Although adverse selection and moral hazard have received considerable theoretical and empirical attention, studies have been conducted in developed economy contexts (e.g., Akerlof 1970; Erdem 1998). The focus of such studies has been on institutions, such as product guarantees and brand names, that help shift risk from buyers to sellers and help buyers create an idea of true product quality/utility. These institutions act as signals (Akerlof 1970), which are observable and alterable characteristics that carry some information (Spence 1973). For signals to function, substantial “time, psychic or monetary costs” must be incurred by signal senders (Spence 1973, p.03). For instance, only sellers that have invested time and money in improving product quality and reducing the likelihood of product breakdowns can offer product guarantees, while low-quality sellers that have poorer quality and higher likelihoods of product breakdowns cannot offer guarantees. If low-quality sellers offer product guarantees, a higher likelihood of product breakdown will create extremely high guarantee fulfillment costs, creating huge losses. In sum, due to signaling costs, sellers of different quality levels must adopt different strategies, creating a separating equilibrium. When sellers use different signals, buyers can easily differentiate between sellers and attach quality expectations with signals, increasing buyer confidence and reducing purchase risk.

Unfortunately, the required institutions and their enabling environments are far weaker in informal markets, making it difficult to use signaling methods that are commonly used in the developed

economy markets, creating challenges in reducing buyer risk. To resolve this pressing issue, the present study seeks to answer the most fundamental question: how can sellers employ signals that reduce buyer risk in an environment that lacks institutions to enforce the signals? Even though product quality is documented to be quite low in informal markets (Karnani 2007; Prahalad and Hart 2002) with high levels of information asymmetry and adverse selection, informal markets continue to function. Since informal markets continue to function – though sellers’ inability to signal quality should create problems, as suggested by information economics (Philippon and Skreta 2012) - it seems that some hitherto unstudied signals shift buyer risk. In contrast, informal markets may function due to a lack of alternative market choices, forcing buyers and sellers in informal markets to interact, putting buyers at a disadvantage. To understand if / how buyer risk can shift and restore some degree of buyer confidence, an understanding of the unique dynamics of informal markets is necessary.

Unfortunately, the current marketing literature makes little attempt to address information poverty and adverse selection issues, although more than two decades have passed since Prahalad and Hart (2002) highlighted the importance of this issue. Table 1.1 and Table 1.2 provide a summary of studies from the marketing literature that deal with informal markets. The tables show that none of the studies in the marketing literature focuses on information-related problems or adverse selection issues in any capacity. For instance, Table 1.1 shows that studies in the marketing literature focus on a range of topics, mostly using case studies, ethnographies, or interviews, with no empirical studies. The studies focus on many topics, such as poverty alleviation and profit-seeking, market output calculation, sustainability, micro-credit, social enterprise development, firm culture, market integration, strategic orientations, community linkages, choice constraints, innovations, CSR activities, managerial practices, ethical marketing, green behaviors, value consciousness, and mobile technology. The issue of adverse selection is ignored.

Some studies mention issues of inequality and power differentials. For instance, Belk and Ghoshal (2017) identify four

problem-causing factors in informal markets, such as patriarchy, bureaucracy and corruption, class/caste power and hierarchies, and uneven and inadequate infrastructure. Similarly, Khare and Varman (2016) detail how institutional settings in informal markets are fraught with inaccessible and indecipherable legality, abusive power relations, and alienation of subaltern subjects. Chikweche (2013) identifies coping strategies that mitigate the impact of social, economic, political, and financial impediments in informal markets. In sum, while some studies focus on poverty and resource inequality issues in informal markets, they completely gloss over adverse selection issues.

Table 1.1 *Marketing literature on informal markets.*

Key findings	Method	Author	Journal
Neo-liberal government policies create a divide between objectives of poverty alleviation and profit-seeking and hamper the success of the e-Choupal information technology initiative.	Interviews in india	Varman, Skâlen, and Belk (2012)	Journal of Public Policy & Marketing,
Identifies coping strategies to mitigate the impact of social, economic, political, and financial impediments in a BOP context.	Case Studies in Zimbabwe	Chikweche (2013)	Journal of Global Marketing
Calculates average income in BOP markets in different countries. Relative to the total market, the BOP sector accounts, on average, for more than 50 percent of the purchasing power in developing countries, with Africa being the most prevalent BOP region.	Secondary data analysis in Asia, Africa, Eastern Europe, Latin America, and the Caribbean	Pitta, Guesalaga, and Marshall (2008)	Journal of Global Marketing
A business model that integrates local people and considers local socio-economic context is a sustainable way to penetrate BOP markets.	Case study in Bangladesh	Rashid and Rahman (2009)	Journal of Marketing Management
Investigates youth's intentions of obtaining microcredit in the post-war era.	Survey analysis in Sri Lanka	Jebarajakirthy and Thaichon (2016)	International Journal of Bank Marketing
Show that inconsistent monthly shifts in income and expenditure create unpredictable changes in expenditure patterns.	Longitudinal study in South Africa	Lappeman, Chigada, and Pillay (2019)	Journal of Consumer Marketing.
The social enterprise development process can be modeled from a systems perspective that incorporates many actors.	Case studies in Philippines	Pitta, Nielsen, and Samia (2008)	Journal of Consumer Marketing
The firms' adaptation to BOP market culture enhances positive influences of customer orientation of	Surveys in Sri Lanka	Jebarajakirthy, Thaichon, and Yoganathan (2016)	Journal of Strategic Marketing

the firm and inter-functional coordination of the firm on CSR.

BOP sellers can sell to high-income markets in certain conditions, such as in presence of payment of delivery options or third-party quality checks.	Experimental design. Study in Benin	Adekambi, Ingenbleek, and Van Trijp (2018)	Journal of Public Policy & Marketing
Institutions in BOP settings are fraught with Kafkaesque elements, such as inaccessible and indecipherable legality, abusive power relations, and alienation of subaltern subjects.	Ethnography in India	Khare and Varman (2016)	Journal of Marketing Management
A strategic orientation that combines innovativeness with proactiveness is the most viable option for improving performance.	Factor analysis. Study in Mexico	Mendoza-Ramírez, and Toledo-López (2014)	Journal of Marketing Management
Provides a framework for sustainable business activity in BOP markets.	Conceptual	Varadarajan (2014)	Journal of International Marketing
A bottom-up approach that involves a commitment to engage with communities in the longer term is required to understand the subsistence markets.	Conceptual	Viswanathan (2017)	Journal of marketing management
BoP consumers make constrained choices due to their vulnerability and try to minimize transaction costs. The constrained retail choice leads to a limited selection of products and brands.	Semi-structured interviews in India	Choudhury, Mukherjee, and Datta (2019)	Journal of Consumer Marketing
BOP producers can integrate with global markets when export market information is generated by formal-sector organizations and when such organizations establish formal ways of sharing information with BOP producers.	Case studies. Study in Benin	Adekambi, Ingenbleek, and van Trijp (2015)	Journal of International Marketing
Create a framework to describe how factors can contribute to the feasibility of grassroots innovation in BOP markets.	Conceptual	Gupta (2019)	Journal of the Academy of Marketing Science
CSR activities aimed at the borrowers' communities affect repurchase intentions positively.	Cross-sectional field study in India	Jose, Khare, and Buchanan (2015)	International Journal of Bank Marketing
Suggest roles for business and government in poverty reduction, with the private sector focusing on employment creation and the government focusing on providing basic public services to the poor.	Conceptual	Karnani (2017)	Journal of Marketing Management
Focus on how the State, markets, and corporations function as pillars of capitalism and have led to deficiencies in BOP markets.	Conceptual	Khare and Varman (2017)	Journal of Marketing Management
Create an adaptive loan recommender system that assists Microfinance Institutions in making informed decisions.	Experiment design. Study in India	Bhaskar and Subramanian (2011)	Journal of Financial Services Marketing

Managerial practices of informal service micro-businesses are developed through a dynamic, integrated network of owners, employees, and customers.	Longitudinal study in Mexico	Reynoso and Cabrera (2019)	Journal of Services Marketing
Suggest a marketing framework for fair and ethical marketing planning.	Case studies	Facca-Miess and Santos (2014)	Journal of Marketing Management
Factors that drive consumers' positive attitudes and intentions to actual adoption of green behaviors involve a combination of perceived personal benefits, decreased perceived risk, and uncertainty.	Interviews in Mexico	Carrete et al (2012)	Journal of Consumer Marketing.
Find that deal-prone customers are value-conscious and price mavens. Bargaining-prone customers are value-conscious price mavens and have a high need for special treatment.	Factor analysis. Study in India	Price et al (2015)	Journal of Consumer Marketing
To help poor producers, help must be provided in the form of credit, strategic advice, and assistance to select markets.	Conceptual	Sashi (2011)	Journal Of Financial Services Marketing
Identifies consumer aspirations, region-based versioning, visible packaging, and product demonstrations as critical for the adoption of products.	Interviews, empirical studies in Chile, India, and 27 countries using longitudinal data set	Arunachalam et al (2019)	Journal of the Academy of Marketing Science
Provide a perspective on consumers and technology from the subsistence marketplaces.	Conceptual	Viswanathan and Sreekumar (2019)	European Journal of Marketing
To sustainably benefit from enhanced market access and resources, people in subsistence conditions need to develop tactical or procedural knowledge, or concrete "know-how," regarding how to be an informed consumer or seller.	Interviews in India	Viswanathan et al (2009)	Journal of Public Policy & Marketing
Mention 4 factors that cause problems in subsistence markets: patriarchy, bureaucracy and corruption, class and caste power and hierarchies, and uneven and inadequate infrastructure.	Conceptual framework. Study in India	Belk and Ghoshal (2017)	Journal of Marketing Management
Evaluates the price, quality, and brand-related shopping predilections of the poor for consumer-packaged goods and then establishes the interrelatedness amongst them.	Conceptual	Kumar (2020)	Journal of Global Marketing

Develop several propositions to form a framework for church-based micro-finance institutions and help improve credit access for the poor.	Conceptual	Koku and Acquaye (2011)	Journal of Financial Services Marketing
Consumers in subsistence marketplaces are not motivated only by functionality and economic needs. If hedonic attributes of a pro-poor innovation are not enhanced and firms do not reduce the internal/external constraints related to the adoption of that innovation, then consumers' adoption intention will be lower.	Empirical analysis in Bangladesh	Hasan, Lowe, and Petrovici (2019)	Journal of Public Policy & Marketing
Explores how social entrepreneurs utilize their unique circumstances and resources at a micro level to facilitate the creation of shared value at the meso-level, leading to inclusive growth at the macro-level.	Case studies from Bangladesh and Nepal	Azmat, Ferdous, and Couchman (2015)	Journal of Public Policy & Marketing
Conceptualizes ways in which mobile phone technology can be used to increase banking access for poor people.	Conceptual	Hinson (2011)	Journal of Financial Services Marketing
Show that relatedness and autonomy improve the negative influence of poverty on life satisfaction, but only if basic life necessities are available.	Hierarchical linear models using 51-country sample	Martin and Paul Hill (2012)	Journal of Consumer Research

While the marketing literature does not focus on adverse selection, some focus on elements that can be categorized as signals. However, the studies do not focus on signaling outcomes i.e., how separating equilibrium is created, or adverse selection is reduced. Table 1.2 summarizes such studies. Some of these studies focus on the impact of brand loyalty on consumer repeat purchases, preference for beauty products, ethics, and prices (e.g., Jaiswal, and Gupta 2015; Wood, Pitta, and Franzak 2008). Pitta, Subrahmanyam, and Gomez-Arias (2008) show consumers' willingness to pay higher prices if product quality is high, but the study does not consider adverse selection or unobserved quality issues. A few studies (e.g., Arnould, and Mohr 2005; Jose, and Buchanan 2013) focus on relationships and social networks in reducing marketing costs and adopting micropayment methods. Jaiswal and Gupta (2015) show how promotions and advertisements lead to higher purchases, while Hens (2008) investigates the impact of extensive distribution networks on buyer/seller trust. Banerjee and Duflo (2007) show how informal market families refrain from specializations, while Gaurav, Cole, and

Tobacman (2011) show how money-back guarantees increase demand for financial insurance.

Table 1.2 *Marketing literature that studies signals in informal markets without focusing on adverse selection issues.*

Brand loyalty (BL)			
Key findings	Method	Author	Journal
BL is not a credible indicator of consumers' share of the heart (emotional attachment), while repeat purchases (RP) are, since (RP) occurs when firms are sensitive to consumers' cultures and likes and dislikes	Conceptual	Pitta, Wood, Pitta, and Franzak (2008)	Journal of Consumer Marketing
Consumers prefer branded beauty products due to the positive post-purchase psychological impact.	Ethnography	Jaiswal and Gupta (2015)	Journal of Consumer Marketing
If consumers believe sellers are being unethical in marketing to subsistence consumers, brand equity decreases.	Ethnography	Gupta and Pirsch (2014)	Journal of Consumer Marketing
Products with the greatest brand loyalty are differentiated and expensive.	Case study	Pitta and Ireland (2008)	Journal of Consumer Marketing
Price			
Key findings	Method	Author	Journal
Consumers are willing to pay higher prices if product quality is higher.	Conceptual	Pitta, Subrahmanyam, and Gomez-Arias (2008)	Journal of Consumer Marketing
References/Relationship			
Key findings	Method	Author	Journal
Differing roles of family members in buying process, such as information collection, reflecting the importance of collaborations	Ethnography	Chikwech, Stantov, and Fletcher (2012)	Journal of Consumer Marketing
Social networks are used by firms in marketing efforts since direct marketing in subsistence markets is expensive.	Ethnography	Chikweche and Fletcher (2012).	Journal of Consumer Marketing
Lack of information support and commitment from the staff of microfinance lenders leads to lower purchase intentions.	Empirical study	Jose and Buchanan (2013)	Journal of Consumer Marketing
Social embeddedness and 1-to-1 buyer-seller relationships create economic and social	Case study and qualitative analyses	Pitta, Sridharan, and Viswanathan (2008)	Journal of Consumer Marketing

benefits in subsistence markets.			
CRM can be facilitated by firms' relationships and connections to consumers' social networks.	Case study analyses	Chikweche and Fletcher (2013)	Journal of Consumer Marketing
Consumers prefer to purchase products from well-known tech brands and evaluate the brand choice impact on relationship networks.	Qualitative interviews, secondary data	Chikweche and Fletcher (2014)	International Journal of Bank Marketing
Social influence has a great influence on consumers' adoption of the M payment method.	Survey	Hussain et al. (2019)	International Journal of Bank Marketing
Population clusters have greater social linkages that create business benefits.	Ethnography	Arnould and Mohr (2005)	Journal of the Academy of Marketing Science
An unusually high degree of interdependence in both economic and noneconomic dealings.	Ethnography	Viswanathan et al (2012)	Journal of Public Policy & Marketing
After using mobile payment services, personal/business relationships improve among social networks due to the absence/removal of physical and emotional frustrations.	Ethnography	Fang, Russell, and Singh (2014)	Journal of Marketing Management
Promotion			
Key findings	Method	Author	Journal
Advertisements, sales promotions, and celebrity endorsements lead to higher purchases.	Ethnography	Jaiswal and Gupta (2015)	Journal of Consumer Marketing
Distribution Network			
Key findings	Method	Author	Journal
An extensive distribution network emphasizes the importance of trust between a company and the poor.	A qualitative study of Tata Motors	Hens (2008)	Journal of Consumer Marketing
Specialization			
Key findings	Method	Author	Journal
Subsistence families avoid specialization.	Household surveys	Banerjee and Duflo (2007)	Journal of Economic Perspectives
Money-back guarantee			
Key findings	Method	Author	Journal
A Money-back guarantee is the only intervention that increases demand for financial insurance among small-scale farmers.	Training program and surveys	Gaurav, Cole, and Tobacman (2011)	Journal of Marketing Research

In sum, none of the studies in the vast marketing literature focuses on adverse selection or unobservable product quality in informal markets, even though people in informal markets have little confidence in product quality (Karnani 2007; Prahalad and Hart 2002). Even if some studies focus on elements that can be classified as signals, the studies do not focus on adverse selection or information asymmetry. Additionally, no studies connect adverse selection with seller resource levels. Unless issues of information poverty and adverse selection are addressed, informal market sellers with meagre incomes will overpay for products and experience lower family welfare due to lesser available resources for nutrition and education. Lower welfare will strengthen the already entrenched resource inequality, leading to a vicious cycle of indefinite poverty and exploitation in informal markets.

To overcome the lack of marketing literature that addresses information poverty and adverse selection issues in informal markets, insights from both the signaling and the informal market literature are used to understand how signals can reduce information asymmetry and adverse selection issues. There are many reasons why the study focuses on signals. Firstly, signals can help shift risk from buyers to sellers, reducing adverse selection. Secondly, signals help to create a separating equilibrium for sellers, allowing sellers to adopt different positioning strategies and differentiate themselves from the competition. Thirdly, since signals require time and monetary resources to function, it is difficult for sellers to imitate signals used by other sellers, at least in the short run. This not only allows sellers to use a specific set of signals to position themselves uniquely but also allows sellers to endure their unique position in the market for long periods, creating durable advantages using signals. Fourthly, since signals are cues that can be altered, as mentioned previously, sellers can use various signals in their marketing mix. Thus, signals allow informal market sellers to reduce adverse selection issues while using unique signal combinations to create durable positioning strategies.

The study provides a novel framework that shows how adverse selection issues are eliminated in informal markets despite the

absence of formal institutions that are vital for shifting buyer risk. The framework in the study (a) offers an alternative mechanism that explains how certain signals work in informal markets given the absence of formal institutions, (b) identifies new signals that can operate in informal markets, and (c) creates a summarizing typology that identifies new and existing signals that cannot operate in informal markets due to the absence of enabling environments, preventing decision-makers from expending resources on non-functioning signals. Later, empirical insights from a field study conducted in a Pakistani cattle market are discussed, showing how informal market sellers can use signals to achieve three key outcomes - increasing credibility/reliability, decreasing price unfairness perceptions, and increasing price. Successfully achieving the three outcomes lowers buyer risk and increases seller profits.

Both the theoretical framework and the subsequent empirical study help set an agenda for useful future research in informal markets, responding to calls from various scholars to understand the unique features of informal markets. For instance, London and Hart (2004) mention that traditional sources of competitive advantage in the developed world, like patents and brands, are difficult to protect in informal markets. Sheth (2011), and Prahalad and Hart (2002) note that informal markets do not follow a western-style industry structure, requiring “a radical rethinking of how business is conducted”. As a first step to improve informal markets, Prahalad (2012) stresses the need to overcome the lack of information and media access. Furthermore, Prabhu, Tracey, and Hassan (2017) highlight the absence of formal institutions that might sustain and maintain formal exchanges between buyers and sellers in informal markets, creating a need to produce informal market-specific institutions that rely on social networks and converging buyer/seller interests. Although Chandy and Narasimhan (2015) stress the need to investigate the role of social networks in information dissemination in informal markets, they also encourage investigating micro-entrepreneurs' attempts to differentiate from the competition and choose various price/marketing mix elements. The study directly addresses the latter issue by investigating how seller signals can help differentiation. Furthermore, citing the lack of

research in informal markets, Moorman (2018) very recently highlighted the need to understand the “role and nature” of marketing activities and their impact on poor and disadvantaged communities. The present study attempts to fill this gap by studying marketing activities that are conducted by disadvantaged communities, making the following contributions in the process.

1. Use current marketing literature to uncover signaling mechanisms and assess their application in informal markets.
2. Discover novel signals that can apply in informal markets along with signaling mechanisms that enable them.
3. Create optimal signaling strategies that allow informal market sellers to achieve three key outcomes: increase credibility/reliability, decrease price unfairness perceptions, and increase the price.

To help create optimal signaling strategies for sellers in informal markets, a sequential approach is adopted. Firstly, it is important to determine which signals in the present literature can operate in informal markets, despite the absence of institutions like those in developed economies. Chapter 2 starts with an overview of the market process in informal markets. The market process provides details of challenges that both buyers and sellers face, showing the key role of signals in addressing these challenges. Furthermore, the fundamentals of signaling theory are discussed and the applicability of various signals in informal markets is evaluated. Chapter 2 shows that successfully using signals rests on one key element: the propagation medium. Each unique propagation medium can only allow certain signals to function. In Chapter 3, word of mouth is identified as the suitable propagation medium for informal markets, and signals that can be successfully used through this propagation medium are identified. A novel informal market-specific signaling framework is also presented in this part. However, given the unique nature of informal markets, sellers cannot simply use all signals. Rather, the sellers’ status in society determines the signals they use. Hence, high-resource sellers use signals that demonstrate financial resources and power in society, while low-resource sellers use signals that demonstrate a willingness to suffer temporary losses for buyers.

Having discussed the unique nature of informal markets and the signals used based on seller resource levels, the study moves towards empirical analysis. In Chapter 4, hypotheses are created. In Chapter 5, the empirical context of the study and the data collection process are discussed along with results from a scoping-phase study. In Chapter 6, interesting market trends are revealed, and empirical models are created, evaluating the impact of signals on different outcomes. In Chapter 7, an optimal signaling strategy is created for sellers based on resource levels to maximize advantages and minimize disadvantages from signal usage. Additionally, the theoretical and managerial implications of the study are discussed along with ideas for further research.

Chapter 2: Literature Review

Chapter 1 discussed the importance of using signals to address adverse selection issues and help sellers adopt unique positioning strategies in informal markets. Chapter 2 begins with an overview of the market process in informal markets. To understand how signals can reduce adverse selection and help sellers adopt unique positioning strategies, it is important to identify the process through which buyers, sellers, and signals interact. This process must describe the key stages of the interaction, the outcomes of the interactions, and the factors that inhibit this process. In this chapter, a process-based approach helps visualize the key elements of the buyer-seller interaction, showing the importance of signals in reducing adverse selection and adopting unique seller positioning strategies. The process-based approach identifies the impact of signals on three outcomes: Perceived Purchase Safety (PPS), Price Unfairness Perceptions (PUP), and seller profits. Additionally, the propagation medium is identified as a key factor that can inhibit or enable signals. Based on signals that can function in informal markets, a new signaling framework is presented.

After describing the market process, specific elements of the market process are described in more detail. Chapter 2 delves deeper into signals and their application in informal markets. Specifically, Chapter 2 discusses the role of signals, the reasons for adopting a signaling approach, and the application of signals in informal markets. In this chapter, numerous signals from the existing marketing literature are cited and their application in informal markets is discussed. Subsequently, many signals that can function in informal markets are identified, although most of the signals cannot function in informal markets. The chapter ends by highlighting the need for a new framework that guides decision-makers in choosing signal combinations that (1) function in informal markets and (2) that allow sellers to reduce adverse selection while adopting unique positioning strategies. One important outcome of discussion from Chapter 2 is that successfully using signals rests on one key element: the propagation

medium. Each unique propagation medium can only allow certain signals to function.

Using this critical insight, Chapter 3 focuses on other key elements of the market process. Firstly, Chapter 3 identifies word of mouth as the propagation medium that enables signals in informal markets. Consequently, signals from the existing marketing literature and new signals that can be enabled by word of mouth are discussed. Secondly, a detailed discussion of the unique social dynamics of informal markets identifies factors that influence seller signaling strategies. Next, specific signaling strategies are proposed that allow sellers to use signals which can be enabled by word of mouth and that allows sellers to communicate their social positions in informal markets. Chapter 4 shows how the use of signals influences the three outcomes in the market process by hypothesizing relationships between signals and outcomes. Later, empirical models evaluate the impact of signals on the three key outcomes (please see Chapter 1), helping formulate optimal signaling strategies for sellers based on seller resource levels.

The conceptual framework for the study rests on the costly signaling theory presented by Akerlof (1970) and Spence (1973). Using the costly signaling theory, issues of information poverty and adverse selection are addressed, allowing informal market sellers with meagre incomes to avoid overpaying for products, increasing family welfare in the process due to greater resources available for nutrition and education. Consequently, greater welfare will help weaken the well-entrenched resource inequality, eliminating the vicious cycle of indefinite poverty and exploitation in informal markets. The chapter begins with an overview of the market process in informal markets.

2.1 The Market Process

As mentioned before, to understand how signals can reduce adverse selection and help sellers adopt unique positioning strategies, it is important to identify the process through which buyers, sellers, and signals interact. Hence, the market process is described first from the buyers' perspective, followed by the sellers' perspective. The

propagation medium is the source of buyer-seller interaction. The role of the propagation medium is discussed in the end.

2.1.1 A Buyers' Perspective

The buying process in informal markets is fraught with challenges. This can best be visualized through a process approach, as shown in Figure 2.1. The process approach describes the process or sequence of events that connect cause and effect (Pentland 1999). To understand the challenges faced by informal market sellers, consider the following buying situation.

A buyer belongs to a poor household. After having worked multiple jobs to save money, the buyer decides to make a purchase. The buyer can buy low-investment products, like fruits/vegetables, or high-investment products, like cows/buffalos. Regardless of the product type, the buyer has little income and must spend it wisely to get the highest value for money. The buyer makes a purchase intention and visits a market. In the market, thousands of buyers and sellers are present. Despite the presence of many sellers, the buyer cannot differentiate between sellers of different quality levels. Due to the presence of feudal lords and exploitive state authorities, sellers do not advertise. Additionally, since fruits/vegetables or cows/buffalos vary from one unit to the next, buyers cannot form accurate quality expectations. No product guarantees are offered. If products of poor quality are bought, buyers cannot seek redemption, since no consumer protection/legal services are present. Since no information technology medium is present which records seller activities or buyer ratings, buyers have little credible information when making a purchase.

When buyers have little information in making a purchase, they face multiple forms of adverse selections. Firstly, buyers might not trust seller intentions. Sellers can easily conceal quality. For instance, sellers of cows/buffalos can sell sick cows/buffalos. The cows/buffalos might appear healthy and can provide high levels of milk. However, cows/buffalos can suffer from a sickness that appears a few weeks after purchase. Additionally, sellers can use manipulative practices to generate high levels of milk when the buyer inspects the cow/buffalo,

effectively deceiving the buyer. The high levels of milk production can decrease a few weeks later when the cow/buffalo returns to its real milk-giving capacity. Similarly, sellers can sell fruits/vegetables that are near the expiry date by artificially enhancing the look of the fruits/vegetables (using readily available chemicals). Since buyers cannot trust seller motives, sellers must address this situation and improve the buyers' Perceived Purchase Safety.

The extent to which a buyer deems a seller credible/reliable is referred to as Perceived Purchase Safety (PPS). Lower credibility/reliability makes it unlikely that buyers trust the motives of sellers, decreasing the likelihood of purchases. When buyers are not certain of the quality a seller is offering and fear that the seller will provide wrong information about quality, buyers face high information costs and high perceived risks. In this case, to reduce uncertainty, information costs, and perceived risks, buyers need to buy many times to learn the true product quality. If buyers believe that they are not being provided information that can help form accurate expectations of quality, the credibility/reliability of the seller decreases, reducing the chances of a transaction. Here, the buyer is unsure of the true quality. Hence, the first challenge for sellers is to increase buyers' Perceived Purchase Safety.

After a buyer decides to transact with a seller, the buyer faces another challenge. The buyer must decide whether the price being offered by the seller is fair or not. The buyer might compare the price of the product with those offered by other sellers. However, since buyers have limited knowledge of the market, they cannot have complete information. Additionally, since product differs from one unit to the next (due to non-uniform products), it is extremely difficult for buyers to accurately compare products. On the other hand, the seller has complete information about the product quality and can compare the quality with that offered by other sellers.

Since buyers have limited market knowledge, buyers create *expectations* of quality based on whatever information they are provided with. Based on these quality expectations, buyers can believe that sellers are charging unfair prices, increasing a buyer's

Price Unfairness Perceptions (PUP), and decreasing the likelihood of purchase. Buyers can believe that sellers are taking advantage of buyers' limited knowledge of the market conditions and are thus charging more compared to the market price. If buyers have high Price Unfairness Perceptions (PUP), satisfaction from product purchases will decrease and post-purchase regret will increase.

It is important to note that both the PPS and PUP relate to seller cheating. However, both represent different phases of the buyer decision process. PPS involves the buyers' perception of seller cheating **before** quality estimates are established, while price unfairness perceptions involve perceptions of seller cheating **after** quality estimates are established. However, it is important to note that both the outcomes do not require a time gap to form. Both PUP and PPS can be created together, instead of forming at different times. For instance, a buyer can believe that a seller is concealing quality, reducing PPS. Simultaneously, the buyer can decide to purchase due to the absence of options. The buyer can form expectations of poor quality and create perceptions of unfair prices if higher prices are charged. By increasing PPS and decreasing PUP, the likelihood of buyer satisfaction and repeat purchase will increase.

2.1.2 A Sellers' Perspective

To improve the likelihood of buyer satisfaction and repeat purchases, sellers must increase PPS and decrease PUP. However, the sellers face many challenges. At one end, there are thousands of other sellers, making differentiation impossible. The presence of exploitive state authorities (that collect taxes, bribes, etc.) makes advertisements difficult since advertisements attract the attention of tax authorities or other corrupt officials. On the other hand, the absence of consumer protection services makes it difficult to decrease buyer purchase risk.

The sellers must find a way (1) to reduce buyer purchase risk (i.e. reduce adverse selection) and (2) differentiate from other sellers. To achieve the two outcomes, sellers can use signals. Firstly, signals reduce purchase risks (i.e. reduce adverse selection) by creating a separating equilibrium, allowing buyers to identify sellers of high- and

low-quality levels. Secondly, since separating equilibriums endure for long periods, sellers can use signals to uniquely position themselves from other sellers. By reducing buyer purchase risk and adopting unique positioning strategies, sellers can increase PPS and decrease PUP, increasing buyer satisfaction and the likelihood of future purchases. To reward the sellers for increasing PPS and decreasing PUP, buyers can compensate sellers with a premium price. The premium price will provide incentives for sellers to use signals and hence continue to increase PPS and decrease PUP.

In choosing signaling strategies, sellers must consider their unique social positions. In informal markets, resource inequalities and power differentials exist. Sellers that are powerful and have higher financial resources have connections within the state and are important to progress in society, such as by helping avoid tax inspections (discussed later). People cannot afford to cut ties with them, although future purchases will reduce to avoid financial losses. Hence, if high-resource sellers offer products of poor quality, they do not face social isolation. However, sellers that lack resources are not vital to progress in society. If low-resource sellers offer products of poor quality, they will face social isolation in addition to the loss of future sales. The unique social positions can influence signaling strategies.

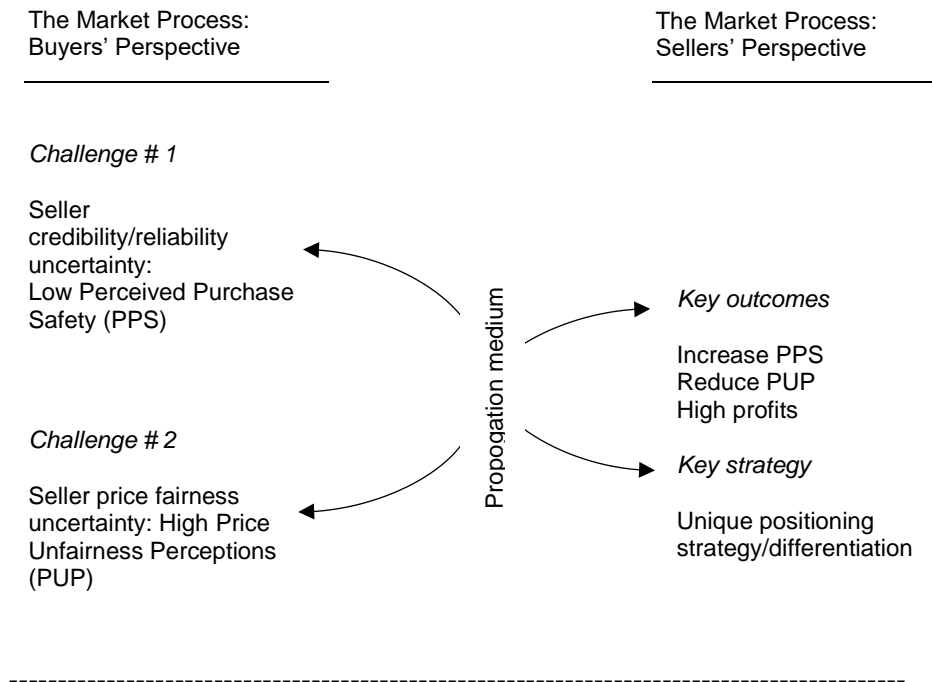
For instance, high-resource sellers will showcase their financial strength and power in positioning strategies, showcasing the benefits of establishing relationships with high-resource sellers. However, low-resource sellers have to compensate for the lack of power and resources. For low-resource sellers, it is important to showcase their emotional attachment/benevolence and willingness to sacrifice. As a result, low-resource sellers will use signals that allow buyers in difficult circumstances to do business with ease, showcasing the benefits of establishing relationships with low-resource sellers. Since buyers in informal markets (1) need to progress in society and (2) need to establish relationships that can help in difficult financial circumstances, both the high- and low-resource sellers can appeal to different customer segments using signals. Hence, high-resource sellers will use signals that showcase power and strength, known as Power &

Resource (PR) signals, while low-resource sellers will use signals that showcase emotional attachment and willingness to sacrifice, known as Emotions & Benevolence (EB) signals. By using PR and EB signals, sellers will be able to (1) reduce adverse selection (i.e. increase PPS and reduce PUP) and (2) adopt unique positioning strategies, differentiating from the competition.

2.1.3 Role Of Propagation Mediums

For signals to function, an appropriate propagation medium is required. The appropriate propagation medium ensures that a signal is observed and analyzed by buyers. Hence, buyers can establish expectations with such signals, which help to reduce PUP or increase PPS. If the medium cannot communicate the information that a seller intends for the buyer, the buyer might get wrong information and hence will not attach expectations with signals that a seller intends. This will reduce the effectiveness of signals. There are many signals studied in the marketing literature. However, the seller can only choose the specific propagation medium that functions in informal markets. For instance, signals which can be propagated through information technology cannot function in informal markets due to weak penetration of the internet and other associated technologies. Hence, it is vital to identify signals that can be propagated in informal markets, allowing sellers to avoid wasting time and money on non-functioning signals. An overview of the market process is shown in Figure 2.1

Figure 2.1. An Overview Of The Market Process



In sum, informal market buyers and sellers face many challenges. The challenges create various inefficiencies in the market process. To improve market efficiency, efforts must be made to improve the market process by addressing the needs of each component in the process. Chapters 2-4 focus on different components of the market process. In the remainder of Chapter 2, the basic tenets of signaling theory are discussed, the study context is clarified, and signals that can apply in informal markets are identified. Chapter 3 discusses the role of propagation mediums and informal market dynamics that influence the selection of signals and positioning strategies. Chapter 4 connects the signaling strategies with the three outcomes, hypothesizing relationships. Chapters 5-7 discuss findings and implications from an empirical study that investigates the impact of signals on outcomes.

2.2 Adverse Selection In Informal Markets

Information asymmetry exists when sellers have pertinent information about a products' true, unobservable quality that the buyer lacks (Rao and Mahi 2003). Buyers can only learn of a products' true

quality post-transaction. Information asymmetry can take two forms (Bergen et al. 1992; Kirmani and Rao 2000; Mishra et al. 1998; Rao and Monroe 1996): adverse selection and moral hazard. In informal markets, adverse selection is likely to be the primary information asymmetry problem for numerous reasons. Firstly, moral hazard occurs in manufacturing-based contractual situations when manufacturers can change product quality *after* committing to specific quality levels. In the case of moral hazard, buyers are concerned about **sellers' intentions of cheating** and **intentionally** reducing product quality post-contract (Rao and Mahi 2003). Thus, moral hazard occurs only when sellers have complete control over all aspects of quality and can change the quality from one unit to the next (Kirmani and Rao 2000).

Although moral hazard can be resolved by providing **incentives** to sellers, this is not relevant for informal markets, since products exchanged in informal markets are typically either grown (e.g., fruits/vegetables/cereals) or reproduced (e.g., cows/buffalos). In the short term, product quality is essentially fixed for both the product categories, and cannot be changed post-contract, or changed from one unit to the next. For instance, the quality of fruits/vegetables is determined largely by characteristics that are fixed and are consistent over the entire crop batch, such as weather conditions or pesticide levels, giving little control over total product quality. For livestock, cow/buffalo quality is determined by fixed genetic and health factors which determine the milk yield in the short term. Over the long term, quality can be marginally improved through diet. However, the total quality of the cow/buffalo cannot be altered by "cheating" post-contract (Heide 2003). At best, true product quality can be **concealed** to create an adverse selection situation.

Thus, adverse selection occurs when buyers are **uncertain about the credibility of sellers' claims** of fulfilling quality obligations (Rao and Mahi 2003). When adverse selection exists, buyers doubt sellers' skills in delivering promised quality. Due to the prevalence of adverse selection in informal markets, the study will not focus on moral hazard. Next, the study investigates the role of signals in resolving adverse selection.

2.2.1 Role Of Signals

Adverse selection can be resolved using signals (Akerlof 1970; Cao and Gruca 2005). Signals are observable and alterable characteristics – excluding fixed attributes like race and age (Spence 1973) - that carry some informational content, allowing buyers to create quality expectations. Over time, signals are associated with certain quality levels. Signals create costs, such as time, psychic, or monetary costs (Philippon and Skreta 2012; Spence 1973). For signals to function, the costs should be extremely high for low-quality sellers, forcing them to use signaling strategies that are different from those used by high-quality sellers. For example, low-quality sellers cannot offer product warranties, since higher product breakdown likelihood and corresponding higher replacement costs will make product warranties infeasible, allowing only high-quality sellers to use product warranties as signals. When sellers of different quality levels adopt different signaling strategies, a separating equilibrium is created, allowing buyers to differentiate between sellers of different quality levels (Spence 1973). Due to the ease of identifying different quality-level sellers, buyer purchase risk decreases (Giebelhausen, Robinson and Cronin 2011; Miyazaki, Grewal, and Goodstein 2005) and provides buyers with means for retaliation if product quality falls below expectations (e.g., tarnishing the sellers brand name) (Akerlof 1970). Based on the discussion above, two properties of signals can be summarized.

1. **Incur costs:** Signals create costs that are negatively correlated with productive capacity, such that high-quality sellers incur fewer costs than low-quality sellers. If all sellers face similar costs, all sellers will invest in signals the same way, reducing signals' ability to differentiate between sellers. Signaling costs act as a bond. If post-purchase product quality is lower-than-expected, buyers can inflict damage on sellers by destroying seller investments in signals e.g., buyers can spread negative word of mouth, negating the impact of sellers' time and money spent in creating higher brand equity through costly advertisements (Kirmani and Rao 2000).

2. **Create a separating equilibrium:** As mentioned previously, only high-quality sellers can incur the time and monetary costs of signals. When low-quality sellers are unable to incur these costs, low-quality sellers must self-select into different profitable strategies, creating a separating equilibrium. Otherwise, a pooling equilibrium is created, failing the signal. When a separating equilibrium exists, low-quality sellers lose future revenues if they mimic signals sent by high-quality sellers, since consumers refuse to repurchase products from low-quality sellers when quality is revealed. Furthermore, low-quality sellers lose revenues that could have been generated in period 1 if they sold only to low-quality buyers in Period 1 (a more profitable strategy) (Kirmani and Rao 2000).

While the two conditions mentioned above are vital for signals to function, signals work when they are easily observable, when buyers are actively searching for them (Connelly et al 2011), when distortion in the medium of propagation is minimum, and when post-purchase consumption unambiguously reveals quality (Kirmani and Rao 2000). After having delved into the basics of signaling, reasons for adopting signaling theory are discussed next.

2.2.2 Why Study Signalling Theory?

There are many reasons why signaling theory is the focus of this study. Firstly, despite the presence of many studies in marketing literature that deal with informal markets, the issue of adverse selection remains unaddressed. Table 1.1 (please see Chapter 1) mentions numerous such studies. Table 1.1 (please see Chapter 1) shows that studies focus on a range of topics, mostly using case studies, ethnographies, or interviews, with no empirical studies. The studies focus on many topics, such as poverty alleviation and profit-seeking, market output calculation, sustainability, micro-credit, social enterprise development, firm culture, market integration, strategic orientations, community linkages, choice constraints, innovations, CSR activities, managerial practices, ethical marketing, green behaviors, value consciousness, and mobile technology. The issue of adverse selection is ignored.

Some studies mention issues of inequality and power differentials. For instance, Belk and Ghoshal (2017) identify four problem-causing factors in informal markets, such as patriarchy, bureaucracy and corruption, class/caste power and hierarchies, and uneven and inadequate infrastructure. Similarly, Khare and Varman (2016) detail how institutional settings in informal markets are fraught with inaccessible and indecipherable legality, abusive power relations, and alienation of subaltern subjects. Chikweche (2013) identifies coping strategies that mitigate the impact of social, economic, political, and financial impediments in informal markets. In sum, while some studies focus on poverty and resource inequality issues in informal markets, they completely gloss over adverse selection issues.

While the marketing literature does not focus on adverse selection, some focus on elements that can be categorized as signals. However, the studies do not focus on signaling outcomes i.e., how separating equilibrium is created, or adverse selection is reduced. Table 1.2 (please see Chapter 1) summarizes such studies. Some of these studies focus on the impact of brand loyalty on consumer repeat purchases, preference for beauty products, ethics, and prices (e.g., Jaiswal, and Gupta 2015; Wood, Pitta, and Franzak 2008). Pitta, Subrahmanyam, and Gomez-Arias (2008) show consumers' willingness to pay higher prices if product quality is high, but the study does not consider adverse selection or unobserved quality issues. A few studies (e.g., Arnould, and Mohr 2005; Jose, and Buchanan 2013) focus on relationships and social networks in reducing marketing costs and adopting micropayment methods. Jaiswal and Gupta (2015) show how promotions and advertisements lead to higher purchases, while Hens (2008) investigates the impact of extensive distribution networks on buyer/seller trust. Banerjee and Duflo (2007) show how informal market families refrain from specializations, while Gaurav, Cole, and Tobacman (2011) show how money-back guarantees increase demand for financial insurance.

In sum, none of the studies in the vast marketing literature focuses on adverse selection or unobservable product quality in informal markets. Even if some studies focus on elements that can be classified as signals, the studies do not focus on adverse selection or

information asymmetry. Additionally, no studies connect adverse selection with seller resource levels. Unless issues of information poverty and adverse selection are addressed, informal market sellers with meagre incomes will overpay for products and experience lower family welfare due to lesser available resources for nutrition and education. Lower welfare will strengthen the already entrenched resource inequality, leading to a vicious cycle of indefinite poverty and exploitation in informal markets.

Other streams of literature also investigate issues of adverse selection, but from a slightly different perspective. For instance, there is some literature on costless signals which can address adverse selection issues. This literature uses product bundles for signaling purposes. However, the literature applies to the services industry in which medium ranked hotel chains use product bundles (e.g., room, Wi-Fi, and breakfast sold together) to compete against higher-ranked hotel chains that engage in second-degree price discrimination through non-bundling strategies (e.g., rooms, Wi-Fi, and breakfasts sold separately) (Moon and Shugan 2018). Other applications include using product bundles to induce product trials. In sum, the literature on product bundles does not apply in an informal market context.

Another stream of literature that focuses on information asymmetry is the credence goods literature. The credence goods literature primarily deals with services, such as taxi rides, medical services, and car repairs across unique situations, such as second-degree moral hazard situations (Balafoutas, Kerschbamer, and Sutter 2017; Dulleck, Kerschbamer, and Sutter 2011). The literature focuses on three inefficiencies that arise from information asymmetry: (a) *Overtreatment* occurs when a seller provides more than what a buyer is looking for, (b) *Overcharging* occurs when sellers charge more than true quality, and (3) *Undertreatment* involves sellers providing lower quality for the price paid. The issues of overcharging and undertreatment are relevant to informal markets, where sellers conceal quality and charge a higher price. While the credence goods literature conceptually overlaps with adverse selection issues, the credence goods literature takes a very different approach to resolve inefficiencies.

The credence good literature deals with inefficiencies by varying 4 factors: (1) liability (a necessity for seller to provide sufficient quality), (2) verifiability of a sellers' action (a necessity for sellers to charge for the quality provided), (3) reputation building (buyers identifying sellers), and (4) competition (option to choose from several sellers). Results show that efficiency can be increased when liability is high, suggesting a need for legal clauses (Dulleck, Kerschbamer, and Sutter 2011). However, in informal markets, adding legal clauses is not possible, while challenges in improving verifiability are tremendous, creating a need for cues that can create perceptions of quality (i.e., signals), as mentioned previously. While the four factors can be varied in informal markets, it is difficult to make changes in practice.

Furthermore, credence goods literature suggests that inefficiency can increase in absence of verifiability and liability - along with an absence of (1) homogenous customers and (2) expert/customer commitment to proceed with intervention after diagnosis (Dulleck, and Kerschbamer 2006). The three conditions hold in informal markets, where customer heterogeneity is high and verifiability and liability are absent, suggesting the presence of high inefficiencies, consistent with the present study's general argument. The credence goods literature depicts a different role of reputation compared to what is commonly observed in informal markets. Specifically, credence goods literature shows that market price mechanisms can influence the role of reputation; as price competition increases, sellers' profit-gaining behaviour intensifies, leading to undertreatment. In this situation, sellers gain little benefit from investing in reputation. As a result, sellers decrease investments in building a reputation. Interestingly, Mimra, Rasch, and Waibel (2016, p.03) mention that "market information about experts' past behavior does not necessarily lead to an improvement in quality", downplaying the importance of intimate seller knowledge in influencing quality perceptions. This seems to contrast with the informal market setup, where communities are strongly linked and past buyer behavior can not only influence quality perceptions but also cause social problems (to be discussed later).

In sum, although credence market literature focuses on resolving information asymmetry, it focuses on varying the 4 factors mentioned previously. The credence market literature does not discuss how separating equilibriums are created or how signal expectations are created. Without guidance on creating separating equilibriums, providing signaling strategies for informal market sellers is not possible. Despite some key differences, the credence goods literature supports the present study's approach, by showing that verifiability (forcing sellers to charge only for what they provide) does not address issues of information asymmetry (Dulleck, Kerschbamer, and Sutter 2011). Rather, a mechanism is required, which in the present study is presented by signals. Next, the study attempts to understand how signals can reduce adverse selection in informal market types that suffer from the highest degrees of adverse selection issues: commodity markets.

2.2.3 Study Context: Physical Commodity Markets In Informal Markets

As mentioned in Chapter 1, informal markets are heterogeneous. Creating a single signaling framework for all informal market types is difficult. Rather, the study focuses on commodity markets. Commodity markets are physical markets where products like fruits/vegetables (i.e., low investment products) and cows/buffalos (high investment milk generating products) are traded. Commodity markets are generally located in rural areas and suffer from the highest levels of adverse selection issues due to poor infrastructure and lack of legal oversight (Minoia and Pain 2017). Furthermore, influence groups, like feudal landlords and their relatives, dominate the rural areas and their governance structures. Coupled with low levels of literacy and general distrust of authority, commodity markets suffer from the highest degrees of adverse selection. The impact of adverse selection and power differentials on a nations' economy is heavily influenced by conditions in commodity markets, since these markets employ large sections of the population, e.g., the livestock sector employs around 50 million people in India (10% of the working population), 30 million people in Bangladesh (44% of the working

population) and 35 million people in Pakistan (50% of the working population) (Rehman et al 2017).

The study now delves deep into the signaling literature and briefly discusses the application of signals in informal markets.

2.3 Signals In The Marketing Literature

In this section, only the important findings for each signal and the application of each signal in informal markets are discussed. The next chapter discusses how word of mouth as the propagation medium enables signals in informal markets and identifies propagation mediums for signals that do not apply in informal markets. Through the signals, issues of information poverty and adverse selection are addressed, allowing informal market sellers with meagre incomes to avoid overpaying for products, increasing family welfare in the process due to greater resources that are available for nutrition and education. Greater welfare will help weaken the well-entrenched resource inequality, eliminating the vicious cycle of indefinite poverty and exploitation in informal markets.

For ease of understanding, signals are divided into two categories: (1) signals that require financial resources, and (2) signals that do not require financial resources. This categorization is similar to one that is used by Kirmani and Rao (2000). Signals in each category are discussed next.

2.3.1 Signals That Require Financial Resources

These signals require sellers to incur signaling costs before sending a signal. For instance, sellers must incur costs to establish large distribution networks or advertise products. If sellers provide products of lower quality, buyers can avoid future purchases, destroying a sellers' investments in creating the signal. The threat of lower future purchases will ensure that sellers do not offer products of lower quality than communicated to the buyers. Signals in this category include (1) Large Distribution Networks, (2) Awards from Neutral Sources, (3) Minimum Starting Bid (MSB), Hidden Reserve

Price (HRP) and Buy-It-Now (BIN) Price, (4) Seals of Approval, Trustmarks, and Third-Party Payment Methods, (5) Multiple Picture Postings, (6) Advertising Expenditures, (7) Education Level, and (8) Slotting Allowances. These are discussed below.

2.3.1.1 Large Distribution Networks

The signal reflects sellers' time and monetary investments in creating a large, efficient distribution network. In case lower-than-expected quality is offered, high costs spent on creating the network are lost, creating a separating equilibrium since only sellers that are confident of their high quality can risk the costs of signaling. In developed markets, a large distribution network is seen as evidence of consistent performance in varied markets (Rajavi, Kushwaha and Steenkamp 2019) and as a signal of firm competency in integrating complex governance forms, such as market contracting and vertical integration, into a single structure (Heide 2003). In informal markets, large distribution networks can act as a signal. For instance, sellers of high investment products, like cows and buffalos, can signal the ability to perform various interrelated functions, such as locate, transport, feed, and maintain cows/buffalos. The large distribution network can also show the ability to work with many other people as a team, an important part of informal market society. For low investment products, like fruits/vegetables, a large distribution network can signal the ability to grow, harvest, and transport products safely.

In sum, large distribution networks can help address heterogeneous customer needs and provide a greater amount of customization, both of which signal higher perceived quality (Coelho and Henseler 2012). If sellers offer lower-quality-than expected, negative word of mouth will spread, leading to reduced purchases, and destroying seller investments in creating the distribution network. The negative consequences will ensure that sellers avoid providing lower-than-expected quality.

2.3.1.2 Awards From Neutral Sources

These are costly and time-consuming awards from neutral sources that only high-quality sellers can gain. These include awards from commercial sources, government bodies, or small business associations. In informal markets, these can include awards from breeder associations or agricultural associations. Sellers of high investment products in informal markets, like cows/ buffalos, can show cow/buffalo handling skills, while low investment product sellers (e.g., fruits/ vegetable sellers) can use awards that show complex organic farming skills. Since low-quality sellers will be unable to incur the time and monetary costs to gain these awards, only high-quality sellers can use this signal, creating a separating equilibrium. These awards play a role like that of reputation (Wang, Beatty, and Foxx 2004) and increase bidder participation in online auction markets (Li, Srinivasan, and Sun 2009). Similarly, in informal markets, these awards can act as proxies for reputation and increase buyer interest in sellers. The awards can be given by local village-level elder-led committees, making it easy to implement the signal.

2.3.1.3 Minimum Starting Bid (MSB), Hidden Reserve Price (HRP), And Buy-It-Now (BIN) Price

These signals have been studied in online auction markets. The MSB publicizes the lowest bidding amount which a seller is willing to accept for a buyer to participate in the bid, while both HRP and BIN are secret prices. HRP is the secret final price at which the seller is willing to sell, while BIN is the secret price at which the seller is willing to end the auction immediately (Li, Srinivasan, and Sun 2009).

These prices act as signals for many reasons. Firstly, they reflect seller valuations of the product, which should help generate bids that are close to the real product value. A low-quality seller looking to conceal quality and dupe buyers will not help buyers accurately assess product value. Secondly, both BIN and HRP create extremely high participation costs for buyers, since bidding can end any moment at the secret prices, reducing participation rates and lowering potential revenues. Only high-quality sellers can sustain these losses. Thirdly,

costs are created when service providers (e.g., eBay) are paid charges to implement the prices. In sum, the high costs of implementing the prices and lowering participation deter low-quality sellers from using the signals.

While the three signals mentioned above can be beneficial for informal market sellers, the application of both BIN and HRP requires an online selling context to keep the prices secret and end the bid automatically once bidders reach seller-specified threshold prices, something which is not feasible in informal markets. The MSB can be implemented in informal markets, for instance when sellers can specify a minimum amount and screen out customers.

2.3.1.4 Seals Of Approval, Trustmarks, and Third-Party Payment Methods

These signals are used in online markets to reduce information asymmetry. They are costly and time-consuming to implement, making it unlikely that low-quality buyers with already meagre profits can sustain the costs. Seals of approval are expensive third-party certifications that show consumers' personal information and online payments are secure, lowering financial risks and increasing trust (Wang, Beatty, and Foxx 2004). Trustmarks are costly third-party marks or logos (usually provided by cyber security experts) that dispel consumers' concerns about privacy and security, showing a greater increase in trustworthiness perceptions and benevolence feelings amongst website visitors when compared to online advertisements or objective-source ratings (Aiken and Boush 2006). Similarly, third-party payment methods offer secure online payment mediums (e.g., PayPal) in return for a percentage of the price, increasing bidder participation in online auction markets (Li, Srinivasan, and Sun 2009). All the signals require the use of online contexts and thus are not feasible for informal markets.

2.3.1.5 Multiple Picture Postings

These pictures are uploaded by sellers to reveal product quality when information asymmetry is high in online auction markets. The pictures are uploaded for a certain price, creating costs for sellers.

The pictures increase consumer confidence and encourage bidder participation (Li, Srinivasan, and Sun 2009). However, since products are physically inspected in informal markets, the signal is unnecessary.

2.3.1.6 Advertising Expenditures

Advertisement expenditures convey a lot of information. For instance, advertisements can signal quality for low-priced products and consumer durables (Kirmani and Rao 2000), although buyers can infer seller desperation and might not infer high quality spontaneously. In online domains, advertisements do not impact sellers' perceived performance (Biswas and Biswas 2004), credibility, benevolence, or trustworthiness (Aiken and Boush 2006), although financial risk, transaction risk, security risk, and privacy risk decrease. On the other hand, advertisements improve shareholders' perceptions of firms' survival chances in tough market environments (Panagopoulos, Mullins, and Avramidis 2018).

In sum, the studies show that advertisement expenses primarily reflect sellers' financial health, not sellers' skills in product workmanship. For informal market sellers, even though credibility, benevolence, or perceived quality are unaffected, advertisements can signal the ability to withstand tough market conditions, making signals that require longer relationships with customers more credible, such as product guarantees. Furthermore, advertisements increase consumers' familiarity with buyers, increasing the likelihood of extracting higher prices. While advertisements can provide many benefits to informal market sellers, advertisements can lose importance in informal markets.

Advertisements lose signaling impact when independent analyst information increases (Du and Osmonbekov 2019), such as when thousands of buyers and sellers spread independent information in informal markets. Since independent information is more credible than seller information, it quickly integrates into the market structure, reducing advertisement effectiveness in informal markets. Advertisements further lose signaling value when advertisements and prices are used to signal together, such as when introducing new

products (Zhao 2000). This is especially relevant for informal market sellers that move to new markets and can use both advertisements and high prices to signal. Advertisements lose signaling value because lower marginal costs of low-quality sellers increase marginal sales/profits from advertisements compared to advertisements used by high-quality sellers. To deter mimicry from low-quality sellers, high-quality sellers must reduce advertisements and use high prices to signal quality, forcing low-quality sellers to use lower prices to reveal quality.

Furthermore, advertisements can create a pooling equilibrium when limited bandwidth and exposure to customers (e.g., little TV ad time or display areas) allow both high and low-quality sellers to reveal only a small subset of product features, making it hard to differentiate between seller types (Mayzlin and Shin 2011). To avoid a pooling equilibrium, high-quality sellers must reduce information about product attributes and encourage consumer search to learn true product quality, while low-quality sellers provide high information to deter consumer information search. While it is better to avoid advertisements to deter mimicry, informal market sellers also tend to avoid advertisements to escape detection by exploitive governments and corrupt tax authorities (please see chapter 3), reducing the feasibility of advertisements in informal markets.

2.3.1.7 Education Level

Consistent with the basic idea of signaling theory about education levels functioning as signals (Akerlof 1973), higher education levels of the Chief Marketing Officer (CMO) signals greater productivity, skills, and social linkages to shareholders, leading to greater firm value (Wang, Saboo and Grewal 2015). Signaling value of education is also consistent with the upper echelon theory (Datta and Guthrie 1994), which suggests that greater educational background is equated with positive attributes of upper management. However, education level acts as a signal only when formal organizational structures with shareholders exist, unlike the less complex, non-formal seller structures in informal markets (e.g., sole

proprietor or partnerships). Thus, the signal is not applicable in informal markets.

2.3.1.8 Slotting Allowances

Slotting allowances apply in manufacturer-to-retailer contexts when manufacturers pay fees to store owners for accessing rare store shelf space. Through the slotting allowances, manufacturers signal their high product quality and products' potential market success to retailers. Low-quality sellers who are not confident of products' market success will not risk paying slotting allowances. In commodity markets, the government-to-seller context can replicate the manufacturer-to-retailer context as described above, when governments lend spaces (e.g., front space, backspace) in markets to sellers based on sellers' potential product success. In developed economy markets, slotting allowances gain more credibility when larger manufacturers have high market ratings or when smaller manufacturers advertise products directly to consumers (Rao and Mahi 2003). However, the effectiveness of slotting allowances in conveying quality information is not always evident (Kirmani and Rao 2000).

Powerful retailers can use high market power to extract higher slotting allowances even when manufacturers' need to signal product quality is absent, such as when retailers know of manufacturers' potential product success (Rao and Mahi 2003). Furthermore, retailers can simply use higher slotting allowances to recover high stocking costs (Desai 2000; Lariviere and Padmanabhan 1997). Although commodity markets are usually government-owned in informal markets, governments can lend spaces to sellers based on a sellers' sales potential (e.g., front of the market, backside, etc.), closely mimicking the retailer-manufacturer relationship as described above. However, since informal market governments are owned by powerful individuals that can extract maximum slotting allowances from sellers, the signaling value of slotting allowances is lost. Rather, slotting allowances will reflect market power abuse by powerful government officials, making the signal unlikely to convey quality information.

2.3.2 Signals That Do Not Require Financial Resources

These signals do not require sellers to incur signaling costs before sending a signal. Rather, signaling costs are incurred after the signal is sent. For instance, sellers can offer product guarantees but incur the costs of fulfilling guarantees only after product malfunctions. Similarly, sellers can offer information in the form of preannouncements without incurring any costs. However, sellers incur costs of providing wrong information when shareholders lose confidence in seller-provided information and reduce future purchases, creating losses for sellers. The threat of lower future purchases will ensure that sellers do not offer products of lower quality than communicated to the buyers. Signals in this category include (1) High Price, (2) New Product Preannouncements, (3) Low-Price Guarantees (LPG), (4) Providing Information About Other Competitors' Prices, (5) Product Warranty, and (6) Unprofitable Customer Management (UCM) & Treatment of Stakeholder Groups, and (7) Low-Introductory Prices. These are discussed below.

2.3.2.1 High Price

This signal offers an implicit commitment to offer high product quality or reduce future product prices and incur a loss of future sales if lower-than-expected product quality is revealed. Fearing the loss of future revenues, low-quality sellers will avoid this signal. There are many benefits that informal market sellers can gain through high prices, such as creating perceptions of higher quality (Erdem and Swait 1998; Kirmani and Rao 2000), greater product reliability (Hen, Kalra and Sun 2009), and increasing perceptions of higher brand equity/reputation (Erdem, Keane and Sun 2008). The benefits can greatly help informal market sellers, especially when entering new markets since high prices are shown to create higher service expectations, especially when sellers' feedback or ratings are outdated (Mitra and Fay 2010). For informal market sellers entering a new market, high prices can create positive expectations and build an initial reputation.

High prices can also allow informal market sellers the added advantage of substituting high prices for costly advertisements (Zhao 2000), which is consistent with informal market sellers' practice of avoiding attention-grabbing advertisements to escape the notice of tax authorities (Khandan 2017). Furthermore, high-quality sellers avoid advertisements to deter mimicry from lower quality sellers who have comparatively lower marginal costs and therefore higher marginal profits per unit of advertisements (Zhao 2000). Thus, high prices can help informal market sellers to avoid spending resources on advertisements and deter mimicry from low-quality sellers.

Despite the advantages of high price as a signal, many factors can inhibit the functioning of high prices as a signal. Firstly, the lack of upfront investments required to use the high price signal creates opportunities for abuse. Potentially, unscrupulous sellers can sell products at high prices in period 1, generate profits, and leave the market altogether – making it difficult to create a separating equilibrium using high price. Given the high price sensitivity of informal market buyers (Karmani 2007), perceptions of unfair prices can form (Guo and Jiang 2016), leading to negative WOM and negative expectations with high prices.

Secondly, since attributes of products exchanged in informal markets are subject to change and are non-uniform – the quality of cows/buffalos or fruits/vegetables varies greatly from one unit to the next – bargaining increases (Brucks and Schurr 1990). Bargaining simply means that buyers and sellers must agree on attribute values for a product and agree on a price. Given the high price sensitivity of informal market buyers (Karmani 2007) and the presence of non-uniform products, informal market buyers are likely to bargain aggressively for given prices. To preserve profits, sellers will increase prices to cover potential losses that arise from bargaining later. Hence, high prices will become a bargaining tool, losing credibility as a signal. Thus, high prices will not act as signals.

2.3.2.2 New Product Preannouncements

This signal requires sellers to undertake intentional communications to create high customer expectations, which, if unmet, can create negative word of mouth and damage seller reputation and profits. Preannouncements include information about new product development or the date of introducing a new product in the market, such as bringing a new breed of cow/buffalo to the market. A separating equilibrium is created when different levels of consumer expectations are created. For instance, in preannouncing a new breed of cow/buffalo that will be brought to the market, only sellers that have maintained the adequate quality of the cow/buffalo and are confident of the quality characteristics can provide specific information, like weight or price of the cow/buffalo, while other sellers who are not certain of the quality characteristics will avoid providing this information. If sellers do not meet the expectations created, they will suffer a loss of reputation due to negative word of mouth (Sorescu, Shankar, and Kushwaha 2007).

Preannouncements can afford great benefits to informal market sellers. Firstly, they can create perceptions of seller innovativeness, even if the preannouncing seller is no more innovative than other sellers in the market (Shams, Alpert, and Brown 2015). Additionally, due to the memory storage structure which helps to create positive perceptions about various seller attributes in the consumers' minds (Anderson 1983), a positive spillover effect can be observed due to preannouncements. Specifically, perceptions of innovation and market leadership can be created within consumers' minds. This is a tremendous advantage for informal market sellers, helping set them apart from the thousands of other sellers. It must also be noted that some positive impact of the signal might be created due to the perceived consumer time investment in the product (when the consumer must wait), which increases perceived quality and satisfaction as time passes (Giebelhausen, Robinson and Cronin 2011).

While preannouncing, sellers must be careful that they do not harm their present products in the market through cannibalization

(Eliashberg and Robertson 1988). For instance, if a seller has many existing products in the market, preannouncement signals can encourage buyers to defer buying a product when they are aware that a new product will enter the market or if the product itself has substantial switching costs (e.g., buying expensive milk giving cow/buffalo). However, if sellers do not face cannibalization risks, they can use preannouncements to encourage buyers to refrain from buying competitor products.

Certain conditions must be fulfilled for preannouncements to signal information. For instance, very specific information must be offered (Sorescu, Shankar, and Kushwaha 2007), which is unlikely to be reversed (Robertson, Eliashberg, and Rymonm 1995). However, as discussed in section 2.2.2.1, attributes of products exchanged in informal markets are subject to change and are non-uniform, increasing bargaining between buyers and sellers (Brucks and Schurr 1990). To preserve profits, sellers will likely quote higher product prices in preannouncements to cover potential losses that arise from bargaining later. Since preannouncements will provide information that is likely to be reversed later, preannouncements will lose their signaling value. Hence, preannouncements will not act as signals.

2.3.2.3 Low-Price Guarantees (LPG)

This signal promises to compensate customers if they find a lower price for a comparable product from other sellers. Usually, this compensation involves paying the difference between the LPG sellers' price and the price another seller in the market is offering, with an optional penalty that sellers can self-impose (Biswas et al 2002). Unlike the product guarantee, which involves replacing the entire product in case product quality is inadequate, costs associated with providing a wrong LPG are comparatively smaller (i.e., paying the customer the difference between the lowest cost in the market and a self-imposed penalty). Similarly, since LPGs require consumers to engage in price search, compare seller prices, and be willing to spread negative word of mouth if seller abuses the signal (Dutta, Biswas and Grewal 2011), no legal systems are required to implement the signal

(unlike the case of product guarantees), making LPGs easy to implement in informal markets.

More specifically, buyers in informal markets have lower incomes and are highly value-conscious, making it considerably more likely that they will engage in price search and compare seller prices (Dutta and Biswas 2005). Furthermore, since buyers can find lower prices (if they exist) almost immediately, due to the large numbers of sellers concentrated in the physical market or at very short distances, LPGs will gain credibility (Srivastava and Lurie 2004) and eliminate feelings of seller opportunism (Kelley 1973; Srivastava and Lurie 2001).

LPGs can create numerous advantages for informal market sellers. Firstly, LPGs lower information costs for buyers, which should reduce product risk since higher information costs lead to higher product risk. Since information costs (and hence adverse selection) are extremely high in informal markets, lowering information costs should also reduce product risks. Secondly, LPGs can create perceptions of lower selling prices for given quality (Dutta, Biswas, and Grewal 2011). This means that buyers feel they are offered the lowest price possible for a given level of product quality. While it can be argued that buyers do not actually know the unobservable product quality of the unstandardized products present in informal markets and thus cannot be sure if the price is the lowest for that quality level, in fact, even with such unstandardized products, benchmarks are present that allow the quality to be estimated. For instance, cows/buffalos can be compared on their milk yield or weight, while fruits/vegetables can be compared on their weight and color. Since the products in informal markets are open to inspection, buyers can quite easily compare these benchmarks, making it easier to implement LPG offers.

The third major advantage of an LPG is that it protects buyers from market price fluctuations (Dutta, Biswas, and Grewal 2011). Such fluctuations are an acute problem for informal markets, which lack effective price control mechanisms and thus experience high price variations. By offering protection against price fluctuations, LPG

sellers will be seen as benevolent and gather higher purchase intentions, especially as price variation increases. One reason is that when market price variability increases, buyers can get a higher gain when they find sellers that offer lower prices than those offered by LPG sellers, leading to larger cost difference refunds from LPG sellers (White and Yuan 2012). At the same time, even if buyers find lower prices from other sellers, they will not experience feelings of trust violations or negative feelings against LPG sellers (Dutta, Biswas, and Grewal 2011). This result is important for informal market sellers, showing that they can avoid a negative personal reputation in case of signal failure.

The lack of needing an elaborate legal framework, the ease of implementing the signal, the ease of verifying prices in presence of many buyers and sellers, and the ease of spreading negative WOM when the signal is abused, make LPGs feasible signals for informal markets.

2.3.2.4 Providing Information About Other Competitors' Prices

The signal requires sellers to provide uncensored information about competitors' prices to buyers, reducing sellers' informational advantage relative to the buyers. A separating equilibrium is created because low-quality sellers will not want to reduce their informational advantage relative to that of the buyers (Trifts and Häubl 2003). By reducing the need for buyers to search and compare offerings of different sellers, sellers using the signal gain buyer trust, increase long-term buyer preferences and brand consideration likelihood, and consequently, increase sales (Liberali, Urban and Hauser 2013). While all these benefits can accrue for informal market sellers, certain conditions must be fulfilled.

Firstly, the signal is most effective when information about the focal seller and the competitors is provided in comparative formats, and when products sold are highly standardized and comparable (e.g., engine power). Additionally, the greatest impact is observed when positively valenced information about the focal sellers is provided (Liberali, Urban, and Hauser 2013). Secondly, consistent with findings

of attribution theory, the beneficial impact of providing competitor information is only observed when sellers occupy a medium-dominant market position (e.g., one that offers the lowest available price in some products, but not all). This is because external factors will not explain a medium-dominant sellers' attempts to reduce their informational advantage and put himself at a disadvantage by providing privileged information to buyers. As a result, the buyer will be less likely to question the information accuracy of a medium-dominant seller, making the signal credible. On the other hand, when sellers who occupy a dominant market position provide competitor quality information (e.g., offer the lowest available price on all products), the information is seen as asserting sellers' dominance with potentially inaccurate information (Trifts and Häubl 2003), making the signal lose its value.

Although the signal can be used in a cost-efficient manner by informal market sellers that occupy a medium-dominant position, the absence of standardized products (e.g., fruits/vegetables or cows/buffalos are non-standardized) and information technology interfaces that provide comparative formats will inhibit the signal, making it infeasible for informal markets.

2.3.2.5 Product Warranty

Product warranties cover product breakdowns and part replacements, making them suitable for products that require substantial use. On the other hand, money-back warranties cover shorter durations, allowing product returns without explanations. Money-back warranties are useful when quality can be revealed without consuming the product, making them applicable when selling search goods whose quality is defined by performance attributes (e.g., fit, style, etc.). For both the warranty types, low-quality firms face higher warranty redemption costs when lower-than-expected quality is revealed, making warranty a feasible signal only for high-quality sellers. Warranties signal reliability of durable goods (mostly for reputed firms, Kirmani and Rao 2000), higher product quality (Chen, Kalra, and Sun 2009) and decrease perceived financial risks (Biswas and Biswas 2004). Thus, warranties can help informal

market sellers signal reliability and high product quality, while decreasing financial risks.

Warranties offer the greatest benefit when delivered by highly reputed sellers since reputation is a high-scope signal which takes time to build and provides diagnostic information for assessing product quality. However, warranties are low-scope cues that can be changed in a short time, providing less diagnostic information. Consistent with cue-utilization theory, reputation (high-scope cue) transfers inferences to warranties (low-scope cues), making warranties more credible when offered by high reputation sellers (Purohit and Srivastava 2001). In addition, when products are sold by high reputation sellers, they can be viewed as carrying implicit warranties (Wirtz, Kum, and Lee 2000). Since informal market sellers are conscious of reputation, warranty signals can be deemed credible, allowing warranties to function as signals without the presence of a legal framework.

Warranties are ideal when information asymmetry is high - such as in informal markets - serving signaling needs. In situations of high information asymmetry, high-quality sellers must offer longer base warranties and very short extended warranties to deter mimicry from low-quality sellers (Soberman 2003). However, when information asymmetry decreases, warranties serve sorting and insurance purposes only, losing their signaling value (Chu and Chintagunta 2011). The presence of high information asymmetry in informal markets means that warranties will fulfill signaling roles, rather than sorting or insurance roles. While sellers of low investment products (e.g., fruits/vegetables) will need to provide short-duration money-back warranties for perishable fruits/vegetables, sellers of expensive cows/buffalos can offer longer base warranties combined with shorter extended warranties to deter mimicry, as described above. Since cows/buffalos are part of a rural household, they can be classified as hedonic items - rather than purely utilitarian items – increasing demand for extended warranties (Chen, Kalra, and Sun 2009).

Despite the feasibility of using a warranty as a signal, many factors can inhibit the signaling value. Firstly, warranties work when they are legally enforced, repeat purchases occur, word of mouth feedback is common, and consumer moral hazard (i.e., consumers irresponsibly damaging the product) is low (Boulding and Kirmani 1993). Although warranty can be implemented in informal markets without the need for legal enforcement as discussed previously, consumer moral hazard presents the biggest challenge. Consumer moral hazard arises when consumers behave irresponsibly and damage the product, for instance when the wrong fodder type is fed to cows/buffalos, decreasing their health and milk yield. The consumers can shift the responsibility of product damage towards the sellers, creating tension and fighting. Due to the prevalence of low incomes and reliance on credit for business transactions in informal markets (many sellers purchase products on loans/credit), reimbursements will be challenging, creating high warranty redemption costs for buyers.

The high warranty redemption costs increase transaction costs, leading to a lesser likelihood of consumer trial, creating negative consumer perceptions (Jain, Slotegraaf, and Lindsey 2007; Moorthy and Srinivasan 1995). Consistent with the Transaction Utility Theory (Thaler 1985) and Persuasion Knowledge Model (Friestad and Wright 1994), higher transaction costs will lower product quality perceptions, since consumers factor transaction costs when creating a mental account of costs and benefits. Thus, prevalence of credit and difficulty of reimbursing warranties on time will increase transaction costs, lowering the signaling value of product warranties, making the signal infeasible for informal markets. Only the presence of a neutral legal authority can force sellers to reimburse on time and settle responsibility of product damage (i.e., deal with consumer moral hazard), stressing the role of a legal framework for the signal to succeed.

2.3.2.6 Unprofitable Customer Management (UCM) & Treatment Of Stakeholder Groups

Like education levels of higher management (discussed previously), UCM and treatment of stakeholder groups can increase firm value. UCM involves tactfully terminating unprofitable customers through time-consuming and costly indirect strategies (without explicit termination), such as increasing fees, providing tiered services, or reducing relationship messages (Fen, Morgan, and Rego 2020). Indirect strategies help avoid customer backlash and subsequent negative WOM, thus avoiding negative shareholder negative evaluations. Likewise, better treatment of organizational stakeholders - customers and employees – requires time and monetary costs but improves firm performance. When firms take actions to improve organizational stakeholder conditions beyond existing regulations or social norms, such as by sharing profits, investor valuations increase (Groening, Mittal, and Anthea 2016). However, UCM and treatment of stakeholder groups act as signals only when formal organizational structures with shareholders exist, unlike the less complex, non-formal seller structures in informal markets (e.g., sole proprietor or partnerships). Thus, these signals are not applicable in informal markets.

2.3.2.7 Low-Introductory Prices

Through low-introductory prices, sellers incur short-term losses but expect profits to increase when buyers learn of true product quality and the price is increased to real levels. For the process to succeed, consumers must be present who are willing to purchase when prices increase to real levels. For the signal to reveal quality information, buyers must believe that seller is selling below the marginal costs of production. High-quality sellers find it difficult to have lower marginal costs compared to low-quality sellers, making it difficult for high-quality sellers to offer prices that are below those of low-quality sellers, leading to a pooling equilibrium.

Using low-introductory price as a signal is difficult in informal markets for many reasons. Firstly, the non-standardized output of

informal markets makes it difficult to calculate marginal costs of production. For instance, fruits/vegetables are produced in non-standardized ways (e.g., different fertilizer quantities in the same field, etc.) or cows/buffalos are given different feeds based on health requirements. Hence, the non-standardized output makes it difficult to communicate marginal costs to consumers.

Additionally, since high-quality sellers have higher marginal costs, such as more expensive feed for cows/buffalos or expensive fertilizers for growing vegetables, offering a price lower than that offered by low-quality sellers is difficult, creating a pooling equilibrium. Most importantly, buyers might believe that low introductory prices are the real product prices and might not buy at higher prices. This effect might be true especially for highly price-sensitive consumers in informal markets (Karmani 2007). In sum, low-introductory prices are not feasible for informal markets. They are more applicable in a manufacturing context, even though no evidence supports that low-introductory prices convey quality information (Kirmani and Rao 2000).

2.4 Need For A New Framework

In Chapter 2, an overview of the market process was provided. Furthermore, the application of signals in informal markets was discussed. After having discussed the signals and their applications in informal markets, it is clear that many signals do not operate in informal markets. Since the market process cannot be improved without effective signals, attempts must be made to improve signal usage. It is necessary to identify the signals that can help reduce information poverty and adverse selection, allowing informal market sellers with meagre incomes to avoid overpaying for products, increasing family welfare in the process due to greater resources that are available for nutrition, and education. Greater welfare will weaken the well-entrenched resource inequality, eliminating the vicious cycle of indefinite poverty and exploitation in informal markets.

The signals in this chapter were categorized based on whether financial resources are required to produce the signals or not. This is similar to classification that is used by Kirmani and Rao (2000).

However, this is a simple classification and does not differentiate between signals that can function in informal markets, making it difficult to derive a signaling strategy. The discussion shows that some signals from both categories – signals that require financial resources and signals that do not require financial resources – can function in informal markets. The study proposes categorizing signals based on propagation mediums so that sellers can (1) understand the underlying mechanisms of signals and (2) determine signals which can be used in informal markets.

From the discussion on signals in this chapter, a conclusion can be derived: successfully using signals rests on one key element, the propagation medium. The propagation medium is the point of interaction for buyers and sellers. The propagation medium is undoubtedly the most important component of the market process. Without an effective propagation medium, buyers and sellers cannot trade efficiently. Simply put, the signaling environment is the physical space where signals are sent and received, such as the physical commodity market in the informal markets, while the propagation medium refers broadly to how the signals are sent and received (Connelly et al. 2011). For instance, press releases and university rankings can provide signaling information using electronic media as the propagation medium. Each unique propagation medium can only allow certain signals to function.

Overview of signals in this chapter showed that many signals function in informal markets, while other signals do not function. In other words, propagation mediums enable certain signals, while impeding other signals. Due to features of the propagation mediums, the informational content of certain signals can be transmitted, while the informational content of other signals cannot be transmitted. If sellers in informal markets use signals that do not function, the information that sellers intend to communicate through the signals will not reach the buyers, leading to waste in efforts expended on the signals. To ease decision-making, there is a need to classify signals based on the propagation mediums they require. In Chapter 3, signals from this chapter are categorized based on propagation mediums that enable/impede the signals. Furthermore, three novel signals are

formulated that can be enabled by word of mouth as the propagation medium in informal markets.

While discussing signals that can be enabled in informal markets, the impact of unique informal market dynamics, especially the role of seller resource levels, must be considered in determining signaling strategies. As discussed in Chapter 1, informal markets suffer from resource inequality and power differentials which create different dynamics for sellers with different resource levels. While choosing signaling strategies, sellers that occupy different positions in the informal markets also need to signal their social positions. Simply categorizing signals based on whether financial resources are required/not required for signaling does not allow sellers to choose signals consistent with their social positions.

To eliminate adverse selection and allow sellers to choose signals that are consistent with their social positions, a novel framework is presented in Chapter 3. The novel framework will identify signals that do not operate in informal markets, allowing signal senders to only use those signals that apply in informal markets. Investing too much time and money on signals that do not apply can lead to inefficient allocation of time and monetary resources. Identifying signals that can operate in informal markets will make it easier to empirically evaluate the impact of signals on the three key outcomes: increasing credibility/reliability, decreasing price unfairness perceptions, and increasing the price. Evaluating the impact of signals on outcomes will reveal signals that can be combined and used together in an optimal signaling strategy by sellers with different resource levels while maximizing (minimizing) advantages (disadvantages) from signal usage. It is not possible to create optimal signaling strategies and evaluate their impact on outcomes unless signals are categorized based on the propagation mediums, showing the importance of the novel signaling framework.

Results from the new signaling framework and the subsequent optimal signaling strategies will improve signaling in informal markets in many ways. For instance, policymakers must ensure that sellers send the same signals that the buyers expect to receive and observe,

creating signal overlap and reducing signal waste. Moreover, through optimal signaling strategies, not only will sellers adopt unique positioning strategies when separating equilibriums are created, but sellers will also create enduring positioning in the eyes of the buyers, making it easier for buyers to identify sellers of different quality levels, decreasing buyer purchase risk. On the whole, creating optimal signaling strategies will improve buyer confidence in informal markets, provide lasting advantages to sellers, and improve market efficiency within informal markets.

Chapter 3: Theory Framework

In chapter 2, an overview of the market process was provided. Signals and their application in informal markets were discussed. While some signals can apply in informal markets, others cannot, due to the absence of propagation mediums that are present in developed economies. The absence of certain propagation mediums makes it infeasible to use many signals that apply in developed economies. In this chapter, signals from Chapter 2 will be classified based on the propagation mediums that enable/impede the signals. As mentioned before, the propagation medium is the most important component of the market process, allowing buyers to observe signals and attach expectations with signals. Simply put, the signaling environment is the physical space where signals are sent and received, such as the physical commodity market in the informal markets, while the propagation medium refers broadly to how the signals are sent and received (Connelly et al. 2011). For instance, press releases and university rankings can provide signaling information using electronic media as the propagation medium. This chapter will show that word of mouth (WOM) is the propagation medium that enables signals to function in informal markets, whereas signals that require other propagation mediums will simply fail to function. In a novel framework, signals are going to be categorized based on the propagation mediums they require to function.

Chapter 2 ended with stressing the need to consider the unique conditions of informal markets that can influence seller strategies, such as the impact of unequal distribution of resources, role of relationships, trust, and reputation. To address the unique needs of informal markets, such as the need to signal sellers' social positions while reducing adverse selection, the present study contributes three new signals – consistent selling locations, investments in product care, and the percentage of credit offered. Together, existing signals in the marketing literature and the new signals contributed by the present study make it easier to create optional signaling strategies and measure the impact of signals on the three key outcomes: increasing credibility/reliability, decreasing price unfairness perceptions, and

increasing the price. Furthermore, using optimal signaling strategies will make it easier to create a separating equilibrium in the market, allowing buyers to differentiate between sellers of different quality levels, reducing purchase risk. The chapter begins by discussing the unique dynamics of informal markets.

3.1 Resource Inequality In Informal Markets

The most salient feature of informal markets compared to developed economy markets is the formation of blatant and abusive power relations (Khare and Varman 2016) whereby “influence groups” dominate informal markets (Khandan 2017, p.38 & 40). These groups consist of rich and powerful people, who wield power within the government and state institutions such as police, courts, regulatory authorities, and bureaucracy (Belk and Ghoshal 2017). Not only can these interest groups get away with crimes, but they also benefit from biased legislation and can disturb the social and economic fabric of society. On the one hand, these influence groups can further increase the economic disparity in their favor; on the other hand, their exploitation of the wider population, underwritten by their power within the government, can drive low-resource sellers to trade in a manner that avoids the pressures of governments dominated by these influence groups (Khandan 2017).

To this end, low-resource sellers adopt several strategies to cope with the various political and social impediments of informal markets (Chikweche 2013), such as severely curtailing their business relationships, avoiding attention-grabbing advertisements, relying on word-of-mouth, and choosing partners only from a “limited pool of well-trusted individuals” who are unlikely to inform tax authorities about their partners’ business (Khandan 2017, p.150). Hence, for the lowest strata in informal markets, the most important considerations are trust and reputation, which take time to build and are costly to lose. This, in sum, shows the importance of kinship and relationship ties for sellers in the lowest strata of informal markets.

As discussed previously, informal markets are characterized by power dynamics and resource inequality, phenomena that are not as notable in developed economy markets. In particular, this study

draws attention to the unique dynamics of informal markets that are dominated by people who are either very poor or extremely powerful (and enjoy tremendous government support). Despite the prevalence of power dynamics, adverse selection, and resource inequality in informal markets, marketing researchers have not studied these issues, as we explained previously in Chapter 1 and Chapter 2.

Despite the lack of focus in existing work on adverse selection or power dynamics in informal markets, it is clear that a huge divide exists between high-resource and low-resource sellers in such contexts. High-resource sellers possess vast financial and land wealth, employ large numbers of workers, and have important linkages within key legislative, political, and power structures. In contrast, low-resource sellers do not possess noticeable financial or land wealth and do not employ helpers for work outside their immediate family (e.g., sons helping their fathers). Since power in informal markets is concentrated in a few people at the expense of the wider population (Acemoglu and Robinson 2012), the high-resource sellers constitute powerful groups that can help people progress in informal markets. For this reason, high-resource sellers are an important part of the social fabric of informal markets. If these sellers offer low-quality products, buyers may avoid future purchases to avoid losses, but are not able to cut their social ties with these sellers. This means that the social and personal standing of these high-resource sellers will remain intact. On the other hand, if low-resource sellers offer products of lower-than-expected quality, they will not only suffer the loss of future purchases but will also suffer a loss in social and personal standing, leading to the threat of social isolation.

Low-resource sellers are drawn from the lowest strata of society and do not wield influence in the society, since the “exclusionary politics” of informal markets lead the high-resource sellers to control all levers of power (Department for International Development 2010). Maintaining social relationships with low-resource sellers is thus not necessary to progress in informal markets. Thus, low-resource sellers can face social isolation directly because of their lack of resources. This phenomenon has been explained by Viswanathan, Rosa, and Ruth (2010), who show that whereas in

developed economy markets business relationships reflect formal exchanges regulated by contracts, in informal markets, business and personal relationships are inextricably interlinked. Consequently, business and personal reputations overlap to a considerable extent, creating the need for all parties to address the emotional needs of the other party and make compromises and sacrifices for others, such as providing credit. Leaving these emotional needs unfulfilled can create perceptions of disloyalty and unreliability.

Furthermore, since people in informal markets generally live in extended families with close kinship ties and prefer to keep village or family level relationships intact, negative business reputation can also affect kinship ties and disrupt key social functions, such as marriage (Yeung, Desai, and Jones 2018). Since the limited incomes of informal market sellers offer little opportunities to relocate (Arimah, and Branch 2011), the stigma created by negative business reputation may endure indefinitely. Thus, given the differential impact on low- versus high-resource sellers when product quality is found by the buyer to be inadequate, it is quite likely that low- and high-resource sellers will each need to adopt different signaling strategies to cater to these different outcomes. Although considerable research has studied issues based on social factors within informal markets (Dembek, Sivasubramaniam, and Chmielewski 2019), studies rarely focus on the signaling perspective or seller's resources, as was discussed in Chapter 1 and Chapter 2. The pressing issue of how sellers can employ signals in an environment that lacks institutions to enforce these signals remains unanswered. These issues are addressed in the new signaling framework, which is elaborated on next.

3.1.1 Inadequacy Of Existing Signaling Frameworks

The overview of the unique social dynamics of informal markets demonstrated that informal markets face significant information asymmetry problems. However, there is little existing research that can offer insight into this situation. In the current marketing literature, Kirmani and Rao (2000) provide the most influential typology of signals. Their work classifies signals by the consequences for the firm should quality turn out to be inadequate and

by whether the signals require sales to occur or not. For example, some signals require upfront costs (without the need for a sale to occur), while for others the costs are incurred only after the sale is done, such as when the firm must pay reimbursements to buyers when they reclaim product warranties. In this way, the framework classifies signals according to various marketing actions.

The typology given by Kirmani and Rao (2000) is an excellent one from a general perspective but unfortunately is not very helpful in considering how signals may operate in informal markets. As explained earlier, such markets are usually neglected by the governments of low-income and emerging economies; they generally exist within what could be termed urban shantytowns and geographically dispersed villages (Karnani 2007), usually with little legal oversight to protect buyer rights. Further, there is little consumption of branded products (Sheth 2011). Lack of technology and communications infrastructure also makes many of the signals that are discussed by Kirmani and Rao (2000) unusable in informal markets. Even so, some marketing research has investigated how phenomena that might be classified as signals according to Kirmani and Rao's (2000) framework may function in an informal marketplace, as was discussed in Chapter 1 and Chapter 2 (see Table 1.1; Chapter 1). However, such work is as yet mainly exploratory and does not consider information asymmetry and the consequent shifting of risk between buyers and sellers.

To develop some insight into how signals may operate in informal markets, it is necessary to consider how the unique business environment of the informal markets might sustain them. As mentioned previously, informal markets are dominated by unequal distribution of resources and rely heavily on strong social relationships, word-of-mouth, personal trust, kinship ties, and reputation. Government intervention is biased in favor of a few powerful people. A signaling framework for informal markets must take these factors into account: it must promote an understanding of the signals in existing frameworks that are most likely to be functioning in an informal market and should also provide direction towards the conceptualization of previously unexplored signals which may be more appropriate to the informal

context. In what follows, a detailed discussion of signals and their propagation mediums is held. Understanding the application of signals and their propagation mediums will help us understand how signals can be created to address the unique needs of informal markets. Using insights from the discussion, the study will contribute three new signals that can address the unique needs of informal markets. These signals are consistent selling locations, investments in product care, and the percentage of credit offered.

3.2 A New Signaling Framework

In Chapter 2, it was mentioned that signals can only work when they are easily observable and when there is minimum distortion in the medium of propagation. In this section, the study identifies various propagation mediums and examines their impact in either facilitating or distorting the signaling environment. In this chapter, signals from marketing literature (please see Chapter 2) are categorized based on their propagation mediums. As mentioned previously, the signaling environment is the physical space where signals are sent and received, such as the physical commodity market in the informal markets, while the propagation medium refers broadly to how the signals are sent and received (Connelly et al. 2011). For instance, press releases and university rankings can provide signaling information using electronic media as the propagation medium. However, if the media reporters provide the information in ways that differ from those that the signal senders intended, or if the signal receivers base their decisions only on information provided by their peers, the propagation medium has distorted the original signal message (Connelly et al. 2011). This distortion in the propagation medium can reduce the ability of the signal receivers to observe the signals in the way the sender intends. If an appropriate propagation medium is present, then sellers can be confident that the signal message they sent will be received by the buyer without any change in the signal message, allowing the buyer to receive the signal as intended by the seller. If this is not the case, the buyer might receive a different signal message than that which the seller intended, making it

easy for the buyer to misinterpret the signal. This might make it infeasible for the seller to use the signal in the future.

In Chapter 2, an overview of signals and their applications in informal markets was provided. However, to guide decision-making, the unique propagation mediums that enable or impede the application of signals must be identified. Hence, signals based on their propagation mediums are grouped in this section. In Table 3.1, propagation mediums that are absent in informal markets and the corresponding signals that do not apply in informal markets are identified. In Table 3.2, signals that apply in informal markets are identified. Specifically, the study shows that word of mouth presents the primary propagation medium through which signals can operate in informal markets. Word of mouth will ensure that signaling information provided by sellers will spread accurately and that sellers will suffer negative consequences if they provide incorrect information. If the propagation medium is not conducive for sending a signal by the seller or being noticed by the buyer, the signal is unlikely to be used. The study now discusses signals and their propagation mediums that are not present in the informal markets (Table 3.1).

Table.3.1 Overview of signals that are infeasible in informal markets

Signal sustained by: Information Technology	Description	Reason for non-application
Minimum starting bid (MSB), hidden reserve price (HRP) & buy-it-now (BIN) price	Prices set by sellers to communicate product value (MSB) or secret prices at which seller ends auction immediately (HRP & BIN), decreasing buyer participation and seller revenues (Li, Srinivasan and Sun 2009)	Requires online auction context to function
Multiple picture postings	Seller posts costly product pictures to communicate product quality (Li, Srinivasan and Sun 2009)	Buyers can physically inspect the quality
Seals of approval, trustmarks, third-party payment methods	Sellers show costly certificates reflecting online security of the sellers' website and increase buyer trust (Wang, Beatty, and Foxx 2004)	Requires online auction context to function
Providing information about other competitors' prices	High-quality seller provides uncensored information about competitors, reducing own information advantage (Liberali, Urban and Hauser 2013; Trifts and Häubl 2003)	Requires online platforms to show information in comparative formats

Signal sustained by: Legal structures	Description	Reason for non-application
Product warranty/money-back guarantees	Can operate in online/physical markets (Biswas and Biswas 2004; Chu and Chintagunta 2011) Reflect higher product quality (Chen, Kalra, and Sun 2009; Jain, Slotegraaf and Lindsey 2007; Soberman 2003)	Consumer Moral Hazard (Boulding and Kirmani 1993) can lead to infeasibly high warranty redemption costs (Moorthy and Srinivasan 1995)
Signal sustained by: Organizational structures	Description	Reason for non-application
Unprofitable customer management (UCM) & treatment of stakeholder groups	Time and money costs are incurred to treat customers well, reflecting the company's future profitability (Fen, Morgan, and Rego 2020) Treat stakeholders well, increasing the company's future profitability and standing (Groening, Mittal, and Anthea 2016)	Requires shareholders to influence the market value of the firm.
Education level	Costly and time-consuming educational attainment of CMOs reflect the greater potential of the firm (Datta and Guthrie 1994; Wang, Saboo and Grewal 2015)	Requires shareholders to influence the market value of a firm
Slotting allowances	Costly fees are paid by manufacturers to retailers to stock products. Signals product quality (Sudhir and Rao 2006). Impact moderated by firm size (Lariviere and Padmanabhan 1997), market ratings (Desai 2000), and market power (Rao and Mahi 2003)	Retailer-manufacturer context does not exist in informal markets
Signal impeded by: Marginal costs	Description	Reason for non-application
Advertising expenditures	Signals quality for durables (Kirmani and Rao 2000) Does not increase product reliability (Aiken and Boush 2006), but increases perceptions of financial health (Biswas and Biswas 2004; Panagopoulos, Mullins, and Avramidis 2018) Independent information (word of mouth) decreases advertisement effectiveness (Du and Osmonbekov 2019)	Low-quality sellers have lower marginal costs, gaining greater marginal benefit per unit of advertising (Zhao 2000)
Low-introductory prices	No evidence that conveys quality information (Kirmani and Rao 2000). Buyers might not believe prices are below marginal costs, might not rebuy when costs increased.	Low-quality sellers might have lower marginal costs, making it easier to send and sustain the signal.

Signal impeded by: Bargaining	Description	Reason for non-application
High price	Create perceptions of higher quality (Erdem and Swait 1998; Kirmani and Rao 2000), product reliability (Hen, Kalra and Sun 2009), and brand equity/reputation (Erdem, Keane and Sun 2008) Can substitute high prices for costly advertisements (Zhao 2000)	Unfair price perceptions can increase (Guo and Jiang 2016) for price-sensitive informal market buyers (Karmani 2007) Non-uniform informal market product attributes increase bargaining (Brucks and Schurr 1990)
New product preannouncements	Can create perceptions of seller innovativeness (Shams, Alpert, and Brown 2015) Can create positive perceptions about various seller attributes in the consumers' minds (Anderson 1983)	Bargaining makes it difficult to offer information that is specific (Sorescu, Shankar, and Kushwaha 2007) and irreversible (Robertson, Eliashberg, and Rymonm 1995).

As shown in Table 3.1, the propagation mediums required to sustain many signals – such as the presence of information technology, complex organizational structures, or a strong legal framework – are absent in informal markets. The propagation mediums and the corresponding signals are discussed briefly now.

Information Technology. Information Technology represents the presence of the internet and corresponding technologies, like the use of smartphones or computers. Since informal markets suffer from poor literacy, low incomes, and poor connectivity, signals that require the use of these facilities are unlikely to be effective. In Chapter 2, the study identified many signals that require information technology to function. For instance, providing competitor information is a signal which requires the information to be provided in a comparative format that requires a technological interface, something that is generally not feasible in informal markets. Similarly, seals of approval, trustmarks, and third-party payment methods require a technological interface and influence buyer outcomes relevant to online contexts, such as consumers' payment protection or online information protection. Likewise, multiple picture postings are relevant only when buyers

cannot directly observe the product, such as in online auctions. Although multiple picture postings can allow sellers to showcase products to distant buyers in informal markets, the lack of internet communication inhibits the signal. Lastly, while sellers can use MSB by modifying it for physical formats, HRP and BIN require a transparent online interface that allows prices to be kept secret and end the auction when seller-specified threshold prices are reached.

Legal structures. Legal structures that protect consumer rights, such as consumer courts, do not function in informal markets. Even if legal protection is present, it will be biased and dominated by an exploitive ruling class, making it unlikely that product guarantees can be implemented impartially in informal markets. Despite the feasibility of using warranty as a signal that was discussed in Chapter 2, chances of consumer moral hazard are extremely high, causing consumers to blame sellers. In this situation, either dispute will occur that can be resolved by an impartial authority only, or sellers will be unable to reimburse buyers in time due to the prevalence of credit/low liquid assets, again creating a need for an impartial intervening authority. In the absence of an impartial legal authority, warranty redemption costs will increase, creating higher transaction costs and reducing signal effectiveness.

Organizational structures. Organizational structures include organization types that involve shareholders and a hierarchical setup. Many signals only apply when shareholders drive the market value of the firm. For instance, education of the management or treatment of stakeholders influences shareholders' perceptions and leads to price changes. However, since complex organizations with publicly traded shares do not exist in informal markets, signals associated with complex organizational structures do not operate in informal markets.

Marginal costs. Some signals can fail in informal markets because high marginal costs may not create sustainable advantages over time. Certain signals, like advertisements and low-introductory prices, create advantages for the signal senders initially, but over a period lose the capacity to create a separating equilibrium due to marginal cost changes, making them infeasible (please see Chapter

2). These signals have also been studied extensively in the developed economy markets, where the marginal cost changes made them non-functional in communicating product quality (Aiken and Boush 2006; Du and Osmonbekov 2019). These signals thus do not seem to operate in either the informal markets or the developed economy markets.

Bargaining. In many situations, buyers are unwilling to accept prices posted by sellers. This occurs when products are of a non-uniform and varying quality, such as in informal markets. When products are of non-uniform quality, the initial attribute information that buyers receive is subject to change (Brucks and Schurr 1990). To determine the final attribute values, buyers and sellers must agree. For instance, a buyer in an informal market might receive certain information about a cow/buffalo. However, the buyer might not believe the information and will try to gather more credible information. In this scenario, the buyer will not trust the price offered by the seller and will instead attempt to negotiate price based on more accurate attribute information (e.g. by inspecting the cow/buffalo, comparing with other sellers, etc.). Hence, signals like high price and preannouncement - which require specific, non-reversible information - will not function. Although bargaining exists in developed economy markets, the products are mostly standardized (due to uniform manufacturing methods), decreasing the need for bargaining and allowing the use of high prices and preannouncements as signals.

The focus of the present study is on the development of a signaling framework for informal markets. This framework is provided in Table 3.2 and identifies the signals that can be sustained in informal markets by word of mouth. These specific signals are likely to help buyers in informal markets differentiate between high- and low-quality sellers, creating a separating equilibrium. Table 3.2 provides a summary of the novel framework. In short, the framework shows that signals which can be sustained solely by word of mouth are likely to be most effective in informal markets.

Table 3.2 Overview of signals that can be sustained by word of mouth alone

Resource Requirements	Power & Resource (PR) Signal: Upfront financial investment by seller necessary	Emotions & Benevolence (EB) Signal: No necessary upfront financial investment
Signals used by:	<ul style="list-style-type: none"> High-resource sellers 	<ul style="list-style-type: none"> Low-resource sellers
Signals	<ul style="list-style-type: none"> Wide distribution network Awards from objective sources Visible investments in product care* 	<ul style="list-style-type: none"> Low price guarantee Consistent selling location* Percentage of credit offered*
Signal Mechanism	<ul style="list-style-type: none"> Financial investment signals resourcefulness pre-sale Evidence of seller confidence in high future earnings Personal and business reputations are separate. 	<ul style="list-style-type: none"> Requires repeated social investment over a long period Personal and business reputations are the same
Reinforcement Mechanism	<ul style="list-style-type: none"> Loss of business reputation. Ability to maintain social reputation regardless of product quality. Loss of future purchases 	<ul style="list-style-type: none"> Loss of social reputation and business reputation. Social isolation Loss of future purchase

** Note that Consistent selling location, Percentage of credit offered, and Visible investments in product care are new context-specific signals that have been created. These will be discussed in due course.*

The framework is the first to categorize the application of signals based on (1) the propagation mediums that are required to sustain and/or impede signals and (2) the resource levels of sellers. Conversely, Kirmani and Rao's (2000) framework, which is dominant in marketing literature, focuses on categorizing signals based on whether the costs of signaling are incurred before or after the transaction is made. However, by categorizing the signals based on (1) propagation mediums that can impede and/or sustain signals and (2) seller resource levels, the study has made it easier to identify how optimal signaling strategies can be adopted in informal markets. The framework can help sellers avoid sending signals that are not

observed by buyers. Avoiding sending unobserved signals is important, not only due to the high costs that are saved, but also because it allows actors to adopt a more structured approach to using signals.

In the balance of this chapter, the study elaborates on the signals that can be sustained by word of mouth, presenting a detailed theoretical discussion of how these signals operate in informal markets. First, the study examines the dynamics of word of mouth as a propagation medium and identifies existing signals in the marketing literature that can be sustained by word of mouth. Then, the study contributes three novel signals – consistent selling locations, investments in product care, and percentage of credit offered- that meet the unique needs of informal markets and that can be sustained by word of mouth as the propagation medium. Together, existing signals in the marketing literature and the new signals contributed by the study make it easier to create optional signaling strategies and measure the impact of signals on the three key outcomes: increasing credibility/reliability, decreasing price unfairness perceptions, and increasing the price. Furthermore, using optimal signaling strategies will make it easier to create a separating equilibrium in the market, allowing buyers to differentiate between sellers of different quality levels, reducing purchase risk.

Indeed, the new framework is a significant response to Prahalad's (2012, p. 05) call for "a radical rethinking of how business is conducted", Moorman's (2018) call to understand the "role and nature" of marketing in the informal markets, and Chandy and Narasimhan's (2015) call to understand how informal market sellers differentiate themselves from the competition.

3.3 Word Of Mouth (WOM) As The Medium Of Propagation

Word of mouth is very important in informal markets and acts as the propagation medium for certain signals (i.e., those in Table 3.2). There are many reasons why this occurs. Firstly, due to the collectivist nature of the informal markets where strong linkages between people

allow information to spread rapidly and through many people (e.g., many people talking about a particular signal), the information provided through signals propagated by word of mouth gains more credibility. This is because independent information is deemed more credible than seller-provided signal information (Konya-Baumbach et al. 2019). As people notice a signal and talk about it more, it gains both more credibility and more observability. Secondly, the consequences of providing false information, especially when the business or personal reputation is at a stake, make it very costly for signal senders to provide false information, reducing the likelihood of a false signal. Thirdly, due to the high costs of a false signal and the ease with which market participants can physically observe the product, sellers of different product quality levels will avoid disguising their true quality, helping create a separating equilibrium in the market. All these factors tend to be very pronounced in commodity markets, where thousands of buyers and sellers can be present at the same time, allowing word of mouth to make certain signals more credible and observable.

Word of mouth produces consequences for providing false information by affecting the reputation of sellers, which was identified earlier as both time-consuming to create and costly to lose. Reputation is a high scope cue (takes time to build) and allows the transfer of perceptions to the lower scope cues (i.e., signals that can be created in a shorter period, see Purohit and Srivastava 2001). Word of mouth can thus sustain signals in informal markets, since negative product quality will lead to negative seller word of mouth that will destroy future sales and business reputation, with the added disadvantage of social isolation for the low-resource sellers. Although word of mouth is also important in developed economies, the presence of limited liability companies means that the harm to individual owners is minimized when the firm suffers harm.

In contrast to the case of developed economies, the harm to low-resource sellers in informal markets also means that they can rely less on the community for support. As mentioned previously, low-resource sellers are unimportant in society, while high-resource sellers are indispensable within society. The higher power differentials that characterize informal markets also lead to higher levels of perceived

competitiveness and make it less likely that low-resource sellers can rely on the community for support, as shown by Jachimowicz et al (2020). Jachimowicz et al (2020) show that in both developed and developing economies, financial inequality alone makes it difficult for people in poverty to rely on the community for support since asking for help can be associated with high psychological costs. This occurs because economic inequality leads to increased perceptions of competitiveness, which can increase status threat and make it less likely that people with lower status would reveal their status and ask for help from the community. The situation in informal markets should be more difficult for low-resource sellers compared with what Jachimowicz et al (2020) show in their study because their study only considered financial inequality, without focusing on the power differentials that pervade informal markets. In sum, the prevalence of power differentials in informal markets seems to support the notion that reputation will function differently for sellers with different resource levels. To differentiate the impact of a reputation for sellers with different resource levels, the study discusses how reputation acts for sellers based on resource levels.

3.4 Differential Impact Of Reputation

While reputation is extremely important for sellers in informal markets, it has a different impact based on seller resource levels. This difference has wide-ranging implications for the signaling strategies that sellers choose. The study will first discuss how reputation impacts high-resource sellers. Afterward, the impact of reputation on low-resource sellers is discussed.

3.4.1 Reputation For High-resource Sellers

Overall, reputation in informal markets is highly valued. However, while it has already received considerable attention in the relevant marketing literature (see Table 1.1 and Table 1.2; Chapter 1), this attention has generally been within the context of creating networks for businesses. In developed markets, reputation has been studied mostly in the form of brand equity and seller ratings (Li, Srinivasan, and Sun 2009), which in informal markets account for less

than 40% of consumption (Sheth 2011). That said, although brand symbols are not used, it is clear that seller reputation, even without the use of advertisement logos and suchlike, remains important in informal markets. Specifically, sellers must make significant time investments to create a favorable reputation. Through this favorable reputation, sellers can reduce information costs and create perceptions of (1) positive product performance (Aiken and Boush 2006; Erdem, Zhao and Valenzuela 2004), and (2) greater seller trustworthiness (Erdem, Swait, and Louviere 2002; Plassmann et al. 2008). Sellers also increase their likelihood of being considered amongst the competition in highly crowded informal markets (Erdem and Swait 2004; Swait and Erdem 2007) and can even lower the price sensitivity of customers.

Perhaps the greatest advantage arises when sellers can promote continuity and pass their reputation on to their progeny through the “brand ally” relationship (Basuroy, Desai and Talukdar 2006; Moorthy 2012; Sichtmann and Diamantopoulos 2013). Should high-resource sellers provide products of lower-than-expected quality, they will face a loss of business reputation, but no impact will be observed on their personal reputation. As mentioned previously, since maintaining relationships with high-resource sellers is important to progress in the challenging informal market conditions, buyers cannot afford to cut social ties with the high-resource sellers, eliminating the threat of social isolation as a punishment for the high-resource sellers. However, to minimize their financial losses, buyers will eliminate future repeat purchases while social relationships will continue as usual.

3.4.2 Reputation For Low-resource Sellers

While the benefits mentioned above can also accrue to low-resource sellers, all these benefits can erode when independent information spreads in the market, showing how simple word-of-mouth can tarnish a seller’s personal and business reputation if product quality is inadequate (Konya-Baumbach et al. 2019) – especially if the seller’s reputation is already weak (Ho-Dac, Carson and Moore 2013). For the low-resource seller, reputation also functions differently. These sellers must tread a more delicate line: On the one hand, they must maintain the profile of a law-abiding citizen and not threaten the

“interests of other people in the society”, such as by not informing about businesses of their friends to tax authorities (Khandan 2017, p.150). On the other hand, the business and personal lives of these sellers are intertwined (Viswanathan, Rosa, and Ruth 2010). They run their businesses with a series of looped social activities with suppliers, customers, and family members. Thus, their business activities are embedded within non-business social relationships, which carry expectations of fulfilling the emotional and benevolence needs of all parties involved (Viswanathan, Rosa, and Ruth 2010).

Not fulfilling these emotional needs can create perceptions of disloyalty or unreliability. Due to the highly interlinked communities, and overlap of business and personal relations, negative business dealings can lead to a negative impact on non-business relationships, such as a lack of marriage proposals, or isolation from communal activities. This can lead to social isolation, something which will destroy the chances of long-term survival for the low-resource sellers’ families in the highly competitive and often exploitive informal markets. The risk of such highly negative outcomes will ensure that low-resource sellers avoid selling products of lower-than-expected quality.

The above discussion implies that, although sellers of all resource levels will suffer a loss of business reputation and loss of future sales if buyers consider that they have not received the quality they expected and paid for, low-resource sellers will *also* suffer social isolation.

3.4.3 Power & Resource (PR) Signals And Emotions & Benevolence (EB) Signals

Given the differences in consequences that sellers of different resource levels will suffer in case quality is lower than expected, high- and low-resource sellers must adopt different signaling strategies. In the case of high-resource sellers who want to gain the benefits which were mentioned in the previous section (Jachimowicz et al. 2020), these sellers will prefer to use signals that require upfront financial investments, which are referred to as *PR signals*. PR signals create a separating equilibrium when sellers can provide evidence of making

significant monetary and time investments in their businesses. This investment is expensive and time-consuming, something which a low-quality seller who is not confident of higher future earnings (through repeat purchase) will avoid. While this investment allows a buyer to identify high-quality sellers, it also allows the buyer to destroy the seller's return on investment by spreading negative word of mouth in case product quality is misrepresented, shifting risk from the buyers towards the sellers. PR signals will not only allow high-resource sellers to assert their status and power but also create a separating equilibrium since high-resource sellers will be motivated to adopt distinct signaling strategies in order not to be confounded with low-resource sellers. Signals in this category are (1) the seller's visible distribution network and (2) awards for the seller from objective sources.

In contrast, low-resource sellers will not be able to use these upfront financial investments. Instead, low-resource sellers will have to use what is termed as *EB signals*. These signals do not require upfront financial investments. Rather, they require sellers to put their social investments in personal reputation at risk to create perceptions of high product quality. Such sellers will incur costs of disguising true product quality when future revenues are lost (as with PR signals), but they will also incur costs of social isolation, as discussed previously. Signal in this category is (1) low-price guarantee. As mentioned previously, both signaling strategies are sustained by word of mouth.

Next, the study briefly discusses how PR and EB signals will be used by sellers with different resource levels. The discussion will shed light on signals that can be sustained by word of mouth as the propagation medium and allow us to contribute three novel signals – consistent selling locations, investments in product care, and percentage of credit offered - that are tailored for informal markets. Together, classifying existing signals in the marketing literature and the new signals contributed by the study into PR/EB categories makes it easier to create optimal signaling strategies and measure the impact of signals on the three key outcomes: increasing credibility/reliability, decreasing price unfairness perceptions, and increasing the price. Furthermore, using optimal signaling strategies will make it easier to

create a separating equilibrium in the market, allowing buyers to differentiate between sellers of different quality levels, and reducing purchase risk.

3.4.3.1 Power & Resource (PR) Signals

Signals in this category are (1) the seller's visible distribution network and (2) awards for the seller from objective sources. These signals require upfront resource investments and are thus unavailable to low-resource sellers. These signals were discussed in detail in Chapter 2. In this section, the use of these signals by high-resource sellers is discussed.

Large Distribution Network. This signal requires the seller to make large investments in creating a logistical network. For example, in the case of a typical informal market, such a network would include workers that grow the product (e.g., fruits/vegetables), maintain the product (e.g., feed and bath cows/buffalos) and safely transport the product (e.g., transport fruits/vegetables or cows/buffalos). Independent scrutiny of this network by numerous buyers, made possible by word of mouth as the propagating medium in informal markets, enables the large distribution network to become more observable and credible as a signal. In informal markets, large distribution networks reflect the ability of sellers to perform multiple functions, address the heterogeneous needs of customers, and provide greater amounts of customization, such as locating expensive and high-quality products and transporting them safely while preserving the product quality. Apart from these business outcomes, large distribution networks also encapsulate social dynamics.

In informal markets, large distribution networks incorporate a range of social factors, such as the existence of extended social networks that bind many people to the high-resource sellers' business, such as close family members or friends. Due to many powerful people aligned with high-resource sellers, a large network of powerful people is created, making it unlikely that low product quality will allow people to cut social contacts with such sellers, even if buyers avoid repeat purchases. The loss of return on investments in establishing the large

distribution network will force the seller to maintain high product quality to avoid negative word of mouth.

Awards from neutral sources. In informal markets, these awards can take many forms. For high-investment products like cows/buffalos, sellers can attain costly and skill-intensive cattle-handling certifications from breeder associations, such as the Buffalo Breeders Association of Pakistan. These could suggest to buyers the sellers' superior ability to maintain the health of their cows/buffalos, and thus better preserve the milk-giving capacity of the cows/buffalos. For low-investment products, like fruits/vegetables, sellers can get costly certifications that show that their crops were grown under organic or healthy practices. Independent scrutiny of these awards by numerous buyers, made possible by word of mouth as the propagating medium in informal markets, enables the sellers' investment in these awards to become more observable and credible as a signal.

While this signal can be regulated by small rural level communities that can form independent certification bodies without need of governmental/legal intervention - for instance a body that checks farming methods of fruits/vegetables or fodder quality and milk yield of cows/buffalos – high-resource sellers will provide quality-as-expected, to avoid negative word of mouth that can destroy investments in certifications.

3.4.3.2 Emotions & Benevolence (EB) Signals

Signal in this category is (1) low-price guarantee. This was discussed in detail in Chapter 2. In this section, the use of this signal by low-resource sellers is discussed.

EB signals require no upfront investment and thus are available to sellers who do not have significant resources (unlike the PR signals discussed above). Of course, the signal is technically available for use by high-resource sellers too, but it is most likely that only low-resource sellers will use this signal. Specifically, high-resource sellers will want to signal their superior financial resources, and thus will tend to avoid using signals that the low-resource sellers use. However, because low-resource sellers also place their personal

reputation at risk when signaling high-quality (unlike high resource sellers who only place their business at risk), low-resource sellers will lose both their personal and business reputation along with future repeat purchases, should product quality prove inadequate. This leads to important differences in how the signals operate between high- and low-resource sellers, and when compared to PR signals.

Low-price guarantees (LPG). As discussed in Chapter 2, LPGs are easy to implement and carry smaller reimbursement costs (i.e., paying price difference and an optional penalty) compared to product warranties (i.e., reimbursing the cost of entire product): LPGs simply require consumers to engage in price search, compare seller prices, and be willing to spread negative word of mouth – behaviors that highly value-conscious and price-sensitive informal market consumers engage in. Independent scrutiny of the LPG by numerous buyers, made possible by word of mouth as the propagating medium in informal markets, enables the sellers' commitment to delivering quality as expected to become more observable and credible as a signal.

LPGs offer low-resource sellers many advantages (please see Chapter 2), such as increasing perceptions of credibility, reducing feelings of seller opportunism, decreasing product risk, lowering price perceptions, increasing feelings of benevolence, and promoting product trial. The large concentration of sellers in informal markets makes it easy to verify LPG information, eliminating feelings of trust violations against low-resource sellers. This result is important for low-resource sellers, showing that they can avoid a negative personal reputation in case of signal failure.

LPGs can also be used in conjunction with high prices by low-resource sellers. Since LPGs guarantee the lowest possible price for the given quality, high prices should then signal the fair price for that quality level. Interestingly, in the literature high price and LPG signals are shown to be quite contradictory to each other (Srivastava and Lurie 2001), because LPGs are more salient cues for products with high base prices, leading to perceptions of higher price dispersion in the market and more gains from price search (when consumers can find

lower prices from other sellers and demand the price difference as compensation from the LPG sellers). Although this might seem to reduce the advantage for the LPG sellers with high prices, the perceptions of offer value and shopping intentions are also likely to be enhanced as well and offset the disadvantages of using these signals together (Biswas et al. 2002). In sum, LPGs can allow low-resource sellers numerous benefits while extracting high profits.

After having discussed existing signals that are appropriate for sellers of different resource levels, the study now discusses novel informal market-specific signals.

3.5 New Theoretical Signals For Informal Markets

The signals discussed previously are present to a greater or lesser extent in developed markets, although they may work somewhat differently due to the presence of legal and other mechanisms for enforcement. However, there are several distinct aspects to informal markets which require the formulation of unique signals, which are undertaken here. These signals can be categorized as either PR or EB, and each capitalizes on one or more key features of informal markets: a) large geographical distances, b) perishability of products, c) lack of effective communications, or d) strong social interconnectedness. The three novel signals proposed here do not require the presence of any legal, organizational, or technological framework to exist and endure, and can be sustained through word of mouth alone. These signals are (1) visible investments in product care, (2) consistent selling locations, and (3) the percentage of price offered as credit.

3.5.1 New PR Signal

Visible investments in product care. In informal markets, buyers are likely to be concerned about the life of the product, especially to avoid exposure to heat or atmosphere. For this reason, sellers who spend larger amounts of money on increasing the survivability of the products – especially since distances between the rural households and markets are likely to be large – will increase

buyer confidence in their product quality. Independent scrutiny of these product care investments by numerous buyers, made possible by word of mouth as the propagating medium in informal markets, enables the sellers' investments to become more observable and credible as a signal. Low-quality sellers will not be willing to invest in product care to the same extent as high-quality sellers, since low-quality sellers will not generate repeat sales when quality is lower-than-expected. Because of the upfront investment required by this signal, low-resource sellers are unlikely to be able to afford to use it.

An example of visible investments in care for low-investment products would be packaging, which protects fruits/vegetables from deterioration due to natural causes. For high-investment products like cows/buffalos, this signal can be implemented in the form of feeding large amounts of fodder to the cows/buffalos. A large amount of fodder will not only show the sellers' investment in the cows/buffalos and confidence in the product's ability to garner high prices but will also act as an additional signal by showing the unobservable quality of the cow/buffalo. Consumption of large amounts of fodder by cows/buffalos ensures that they are not sick and that they will be able to continue to provide milk for long periods since cows/buffalos lose weight as milking progresses.

By investing large amounts of money on visible investment in product care, sellers provide a signal that shifts risk from buyers to sellers. This signal does not need the presence of institutions (e.g., consumer law) to be successful. The presence of strong social relationships and the spread of negative word of mouth mean that sellers would lose investments in product care if their reputation were tarnished, as discussed previously.

3.5.2 New EB Signals

Percentage of credit offered. Buyers and sellers in informal markets generally have low disposable incomes. The strong social linkages and cultures of informal markets create expectations that all parties involved in a transaction must support each other. This can be manifested in the form of buyer purchasing products from a seller

during the latter's difficult times or the seller offering buyer credit for purchase (Viswanathan, Rosa, and Ruth 2010). By allowing the buyer to pay a percentage of the price later, not only is the seller binding the buyer to the seller, but also reducing the buyers' risk and implicitly allowing the buyer to repay the remaining money only if the quality is as expected. A low-quality seller will not employ this signal since the low-quality seller will lose money if product quality is inadequate. As a result, only high-quality sellers who are confident of their quality can use this signal. Independent scrutiny of the credit offered by numerous buyers, made possible by word of mouth as the propagating medium in informal markets, enables the sellers' commitment to delivering quality as expected to become more observable and credible as a signal.

Although credit has been studied in both developed economies and informal markets (see Table 1.1 and Table 1.2; Chapter 1), the signaling role of credit has not been studied. However, the signaling role of credit is especially important for low-resource sellers in informal markets since their business relationships are based on feelings of empathy, benevolence, and maintaining communal relationships (Viswanathan, Rosa, and Ruth 2010). To fulfill these purposes, suffering a temporary loss for the benefit of others is a strong signal of emotional commitment from a low-resource seller, which is also likely to fulfill the reputational needs of low-resource sellers to be seen as responsible and honest members of the society (Khandan 2017). For high-resource sellers, since emotional commitment is not particularly important, this signal loses much of its utility. Additionally, in developed economy markets, since business relationships are generally governed by formal contracts, credit is unlikely to function as an emotional commitment, instead constituting a practical business clause that suits the interests of both the buyers and the sellers. Credit, therefore, does not act as a signal in developed economy markets in the way it does in informal markets.

Consistent selling locations. Due to the frequently large geographical distances between buyers and sellers in informal commodity markets, and the presence of a multitude of buyers and sellers (there can be thousands of buyers and sellers in a market), it

can be difficult for a buyer to reliably spread negative word of mouth regarding the sellers, especially across different trading sessions of a market over time. As a result, if sellers willingly choose a consistent selling location in each trading session of the market, they make it easier for buyers to find them in subsequent sessions and expose themselves to buyer backlash and negative word of mouth if product quality falls short. This is especially important for low-resource sellers, who rely on personal reputation to signal credibility. In this way, the seller is offering a commitment to the buyer, such that the buyer can easily locate the seller when needed and spread negative word of mouth with ease. This signal will itself strengthen the propagating medium, while also emphasizing the sellers' commitment to delivering quality as expected.

Low-quality sellers will not take such a risk and will thus refrain from using this signal. As a result, a separating equilibrium is created. This will produce expectations that sellers who choose consistent selling locations have higher quality, ensuring that the signal works without the need for institutions that protect buyer rights since word of mouth will sustain the signal. While both high- and low-resource sellers can use this signal, this signal will not be used by high-resource sellers, since they do not need to offer their personal reputation to make the signal credible, as discussed previously.

Conclusion

Informal market buyers and sellers face many challenges. These challenges create various inefficiencies in the market process. To improve market efficiency, efforts must be made to improve the market process by addressing each component in the process. Chapter 2 provided an overview of the market process and discussed the basic tenets of signaling theory, the study context, and signals that can apply in informal markets. In this Chapter, the role of propagation mediums and informal market dynamics that influence the selection of signals and positioning strategies is discussed.

In this chapter, the study mentions that despite facing high degrees of adverse selection, informal markets continue to function. To bridge the gap in understanding of how informal markets continue

to function, a signaling framework is proposed which shows how word of mouth can sustain signals and allow sellers with different resource levels to use signals with different outcomes. This framework departs from the existing signaling literature by identifying signals that sellers can use based on the level of resources that sellers possess. This chapter also identifies signals that are unlikely to operate in the informal markets, using this knowledge to identify several traits of informal markets that can give rise to new potential signals. Consequently, the study contributes three novel signals – consistent selling locations, investments in product care, and percentage of credit offered - that are appropriate for informal markets, and that can be sustained by word of mouth as the propagation medium.

Together, existing signals in the marketing literature and the new signals contributed by the study make it easier to create optional signaling strategies and measure the impact of signals on the three key outcomes: increasing credibility/reliability, decreasing price unfairness perceptions, and increasing the price. Furthermore, using optimal signaling strategies will make it easier to create a separating equilibrium in the market, allowing buyers to differentiate between sellers of different quality levels, and reducing purchase risk.

The study hopes to provide an important early step in developing a greater understanding of the functioning of informal markets, and that in doing so it can provide an impetus for improving the lives of those who participate in them. Chapter 4 connects the signaling strategies with the three outcomes of the market process, hypothesizing relationships. In Chapter 5, the context of the field study is discussed, providing an overview of the data collection methods. Market trends are described in Chapter 6. In Chapter 6, results and implications from the empirical model are discussed, providing optimal signaling strategies for both the high-resource and the low-resource sellers.

Chapter 4: Hypotheses Development

In Chapter 1, it was discussed that the goal of the study is to determine how informal market sellers can use signals to achieve three key outcomes - increasing credibility/reliability, decreasing price unfairness perceptions, and increasing price. Successfully achieving the three outcomes lowers buyer risk and increases seller profits. Before providing optimal signaling strategies for sellers, a greater understanding of signals and their applications in informal markets is required.

To improve market efficiency, efforts must be made to improve the market process by addressing each of the components in the process. Chapters 2-3 focus on different components of the market process, focusing on the application of signals in informal markets, the impact of unique informal market dynamics, and the role of propagation mediums in signaling. Specifically, Chapter 3 showed that signals in informal markets are enabled by word of mouth and that signaling strategies vary with seller resource levels.

While the previous three chapters analyzed the feasibility and usefulness of signals and identified signals that can reduce adverse selection and allow sellers to adopt unique positioning strategies, this chapter is going to focus on the impact of signals on market performance. As mentioned previously, informal market sellers must overcome many challenges to increase transactions and grow businesses. Achieving the three key outcomes is vital to address issues of adverse selection, allow sellers to adopt unique positioning strategies that showcase their social positions, and increase market efficiency. This chapter connects the signaling strategies with the three outcomes of the market process, hypothesizing relationships.

In this chapter, a series of hypotheses are presented which are tested using empirical models from field study data. The hypotheses clarify the relationships between the three outcome variables, the signals, and the seller resource levels. The hypotheses also clarify the mediation relationships between the three outcome variables. Before

proceeding to the hypotheses, the three key outcomes and their importance for informal market sellers are discussed in detail.

4.1 The Three Key Outcomes: PPS, PUP, and Price

The study focuses on how informal market sellers can use signals to achieve three key outcomes - increasing credibility/reliability, decreasing price unfairness perceptions, and increasing price. The three outcomes reflect three obstacles that informal market sellers face. In the study, the extent to which a buyer deems a seller credible/reliable is referred to as Perceived Purchase Safety (PPS), whereas the extent to which buyers believe that sellers are offering fair prices given quality levels is referred to as Price Unfairness Perceptions (PUP).

Lower credibility/reliability makes it unlikely that buyers trust the motives of sellers, decreasing the likelihood of purchases. When buyers are not certain of the quality a seller is offering and fear that the seller will provide wrong information about quality, buyers face high information costs and high perceived risks. In this case, to reduce uncertainty, information costs, and perceived risks, buyers need to buy many times to learn the true product quality. If buyers believe that they are not being provided information that can help form accurate expectations of quality, the credibility/reliability of the seller decreases, reducing the chances of a transaction. Here, the seller is unsure of the true quality.

On the other hand, buyers create *expectations* of quality based on whatever signaling information they are provided with. Based on these quality expectations, buyers can believe that sellers are charging unfair prices, increasing a buyer's price unfairness perceptions, and decreasing the likelihood of purchase. Buyers can believe that sellers are taking advantage of buyers' limited knowledge of the market conditions and are thus charging more compared to the market price. Here, the seller has developed an expectation of quality.

Although the first two outcomes - increasing credibility/reliability and decreasing price unfairness perceptions – are both about sellers cheating buyers, credibility/reliability (and thus PPS)

involves the buyer's perception of seller cheating **before** quality estimates are established, while price unfairness perceptions involve perceptions of seller cheating **after** a buyer has established quality estimates.

The perceptions of credibility/reliability and price unfairness perceptions can be created together, instead of forming at different times. For instance, a buyer can believe that a seller is concealing quality, reducing credibility/reliability. Simultaneously, the buyer can form expectations of poor quality and create perceptions of unfair prices if higher prices are charged. By increasing credibility/reliability and decreasing price unfairness perceptions, buyer risk will decrease, boosting efficiency in informal markets. The third outcome – higher prices - is necessary for informal market sellers to grow and further improve the functioning of informal markets.

To improve market performance, Informal market sellers must achieve the three key outcomes. If sellers are not deemed credible/reliable or are deemed offering unfair prices, buyers will not trust the information provided by the sellers, lowering the likelihood of a transaction. It was shown in Chapter 1 that buyer confidence in product quality and seller-provided information is very low in informal markets, increasing the importance of higher credibility/reliability for informal market sellers. To sustain the growth of their businesses and end the vicious cycle of exploitation and poverty, informal market sellers need to maximize opportunities for transactions. If the three key outcomes are not achieved, informal market sellers cannot improve market performance, reducing the growth and efficiency of informal markets.

As explained previously, PUP is different from PPS. Although both involve sellers cheating, lower credibility/reliability occurs when cheating occurs **before buyers establish** quality estimates, while lower price unfairness perceptions form **after** a buyer has established quality estimates. While PPS refers to the extent to which buyers believe that a seller will actively delude them and provide wrong information about quality, PUP refers to the extent to which buyers believe that a seller is charging an unfair price given the market

conditions. As mentioned previously, the perceptions of credibility/reliability and price unfairness perceptions can be created together, instead of forming at different times, such as when concealing quality lowers seller credibility/reliability, and buyers create quality expectations using the limited information, judging higher prices as unfair.

When PPS is high, buyers must buy many times to learn of true product quality, reduce information costs, and lower perceived risks of purchase. On the other hand, when PUP is high, buyers believe that sellers are taking advantage of buyers' limited market knowledge (about prices and products) and are charging greater than the market price. They do not in this case feel the need to buy to establish true quality but instead feel the price charged is not commensurate with the quality they have perceived the seller to offer. If buyers expect sellers' prices to be commensurate with perceived quality, buyers face no uncertainty. However, if seller prices are greater than buyers' perceived product quality, sellers are charging more than what the product is worth, creating buyer uncertainty and increasing buyer purchase risk.

While PPS is closest to the classic type of information asymmetry dealt with by traditional signal theory, PUP is also a very important outcome for many reasons in informal market contexts. As mentioned previously, due to low-income levels, informal market consumers are very price sensitive (Karnani 2007). If consumers believe that sellers are charging greater than what is offered in the market for similar quality, they will stop buying. As mentioned before, buyers might believe that a seller is taking advantage of buyers' limited market knowledge (i.e., information asymmetry) and distrust the value offer provided by the seller, reducing the chances of a transaction. Hence, informal market sellers must decrease perceptions of price unfairness.

To create sustainable businesses, informal market sellers must generate the highest prices for given quality levels. This is the monetary value of the product sold. If informal market sellers provide high-quality products (e.g., cows/buffalos or fruits/vegetables) but do

not get higher prices, they will lose incentives to provide high-quality products. Spence (1973) and Akerlof (1970) mention that signal senders need incentives to incur costs for sending signals. These incentives can be in the form of higher payoffs. For instance, in the job market, higher education acts as a signal which is rewarded with higher incomes from employers.

Similarly, sellers in informal markets that incur costs and provide high quality need to have incentives, higher prices, in this case, to signal. Without a high price, informal market sellers can lose the motivation to use signals and deliver high-quality products (e.g., cows/buffalos or fruits/vegetables), creating market inefficiencies. Additionally, a market can also reward sellers based on non-signals, such as race or education level, etc. (Spence 1973), showing that different equilibrium levels (and payoffs) can exist in a market for different seller types. This lends support to the study's argument that signals can function differently for sellers with different resource levels, such that high- and low-resource sellers get different rewards based on signals used.

After discussing the importance of the three key outcomes for informal market sellers, it is important to see how signals can impact the three key outcomes.

4.1.1 Differential Impact Of Signals On Outcomes

The impact of signals on the three outcomes can vary, (1) creating the need to determine how signals influence the three key outcomes and (2) necessitating the need to find ways to minimize (maximize) disadvantages (advantages) of the signals, creating optimal signaling strategies. There are many ways in which the same signals can impact the three outcomes differently. For instance, offering product guarantees can increase seller credibility/reliability, by showing that sellers trust the quality information sellers are providing. Otherwise, sellers would not risk offering guarantees. However, perceptions of price unfairness can increase if buyers believe that sellers are charging an unjustifiable price premium due to the guarantees. Similarly, sellers can use the product packaging as a

visible investment in product care to better preserve product quality. However, this can create perceptions of lower credibility/reliability if the product packaging makes it difficult to inspect the product quality, such as when fruits/vegetables use multiple package layers to protect against harsh informal market weather conditions – such as sunlight or humidity. If a seller charges higher prices when offering improved packaging, a seller might be seen as concealing quality and charging unjustifiable prices.

Furthermore, signals may be associated with different outcomes. For instance, advertisements lead to higher seller prices (Du and Osmonbekov 2019) but do not improve perceptions of sellers' credibility or trustworthiness (Aiken and Boush 2006) and workmanship. Similarly, low-price guarantees can increase feelings of seller benevolence but can lead to negative consumer emotions if efforts that are required to verify the low-price guarantee offers also increase (see Chapter 2). The reason these differences occur is that signals become associated with expectations over a period as buyers repeatedly interact with them (Akerlof 1970; Spence 1973). Hence, signals can influence outcomes differently since buyers have attached different expectations. Akerlof (1970) mentions that in studying signals, researchers are looking at a snapshot of the market, showing expectations attached with signals in that period. In other words, buyers might have created expectations with signals that differ across outcomes. These expectations might affect some outcomes positively and some outcomes negatively.

From the discussion above, it is clear that in formulating a signaling strategy, sellers need to view signals together and holistically, rather than seeing the signals individually and in isolation. This study is the first to follow such a holistic approach and formulate signaling strategies based on both positive and adverse outcomes of signals across different consequences.

As mentioned earlier in Chapter 2, the context of this study is the physical commodity markets where products like fruits/vegetables (i.e., low investment products) and cows/buffalos (high investment milk generating products) are traded.

In the next section, hypotheses are discussed for the signals and their impact on the three key outcomes.

4.2 Hypotheses

In Chapter 3, it was mentioned that only those signals will function in informal markets that are sustained by word of mouth. In contrast, signals that require other propagation mediums, like information technology, complex organizational structures, or legal intervention, will not function. When signals are used that require propagation mediums other than word of mouth, the signaling environment will distort the signaling message. The buyers will not receive the message intended, reducing the utility of the signals (please see Chapter 3). In the next section, hypotheses are presented for signals that are enabled by word of mouth. The section discusses how the signals will specifically impact the three key outcomes, allowing sellers to combine signals in optimal signaling strategies.

4.2.1 Signals Enabled By Word Of Mouth

4.2.1.1 The Moderating Role Of Seller Resources

As mentioned in Chapter 3, signals sustained by word of mouth are divided into two categories. PR signals require upfront financial investments and are theorized to be used by high-resource sellers to showcase their financial status and power, while EB signals are theorized to be used by low-resource sellers to show their emotional attachment and pro-social behavior. Hence, high-resource sellers will use PR signals to achieve the three key outcomes, while the low-resource sellers will use the EB signals to achieve the three key outcomes. The impact of signals used by both high-resource (PR signals) and low-resource sellers (EB signals) is discussed next.

4.2.1.2 Impact of PR And EB Signals On The Three Outcomes

Perceived Purchase Safety. PPS refers to the extent to which buyers are confident that sellers' product quality is as expected and that the buyer is not cheating. However, if the buyer is sure that the

seller is not cheating and is delivering quality-as-expected, then buyers should attach expectations of seller trustworthiness with certain signals. By using signals associated with seller truthfulness and trustworthiness, sellers can establish buyer trust.

As discussed before, high-resource sellers and low-resource sellers will use different signals. Specifically, high-resource sellers will use signals that showcase power and resources (PR signals), while low-resource sellers will use signals that showcase emotional bonds and benevolence (EB signals). To create a separating equilibrium, high-resource sellers will avoid using EB signals. Although low-resource sellers might attempt to use some PR signals, it is hypothesized that PR signals will not produce positive outcomes for low-resource sellers. PR signals are inconsistent with a low-resource sellers' position, meaning that the market will have positive expectations for PR signals when used only by high-resource sellers.

It is expected that all PR signals – visible investments in product care, awards from neutral sources, and wide distribution networks – will positively influence PPS for high-resource sellers. There are many reasons to expect that PR signals will increase PPS for high-resource sellers. Firstly, all PR signals allow buyers to harm sellers' time/monetary investments in signals. By showing a seller's investments in product care, awards from neutral sources, and wide distribution networks, sellers are offering investments made in the signals as security. If sellers provide lower-than-expected quality, buyers will reduce future purchases and harm seller investments in the signals, leading to huge losses for sellers. Hence, buyers do not expect sellers that use the three signals to provide lower-than-expected quality, increasing reliability/credibility perceptions.

Secondly, the signals also reduce the informational advantage of high-resource sellers relative to buyers, increasing trust and preferences for sellers, as shown by Trifts and Häubl (2003). Visible investments in product care can reduce the informational advantage of sellers for both low- and high- investment products. For instance, expensive product packaging for fruits/vegetables can not only preserve product life by protecting from tough informal market

environments (e.g., sunlight, humidity, etc.), but provide information about the expected life of the product (i.e., how long fruits/vegetables will last or preserve their taste). Elements of product packaging, such as type of packaging (e.g., thicker packaging, lighter packaging, printing quality, etc.) provide information about seller investments in product and expectations of returns. Low-quality sellers that do not expect to receive profits will not invest heavily in product packaging, offering lower quality packages. Hence, buyers will not believe that packages used by low-resource sellers reflect investments in product care.

For high-investment products, visible investment in product care can also reduce the informational advantage of sellers. For instance, the amount of fodder that is fed to cows/buffalos will not only show a high-resource sellers' visible investments in product care but also reveal quality. As mentioned in Chapter 3, cows/buffalos that eat fodder are both healthy and disease-free. Many diseases are revealed when cows/buffalos consume fodder, allowing buyers to increase quality information.

By using the three PR signals, high-resource sellers will reduce the uncertainty that buyers face, increasing PPS.

Hypothesis # 1A: *When high-resource sellers use visible investments in product care, wide distribution networks, and awards from neutral sources as signals, PPS will increase.*

As mentioned in the novel framework (Chapter 3), low-resource sellers will use the EB signals. EB signals identified in the novel framework are low-price guarantees, consistent selling locations, and the percentage of credit offered. It is expected that LPGs, consistent locations, and percentage of credit will increase PPS for low-resource sellers. Importantly, signals which show sellers' benevolence and emotional attachment with the buyer, and sellers' willingness to suffer for the buyer will positively impact PPS.

To show benevolence, low-resource sellers can use many signals, such as percentage of credit, and low-price guarantees (LPG). There are many reasons why these signals create feelings of

benevolence. For instance, offering a percentage of credit shows sellers' willingness to suffer for the buyer. If buyers do not find the post-purchase quality to be adequate, they can refuse to repay the remaining price. By offering a percentage of credit, sellers are showcasing their concern for the buyers. Similarly, offering LPGs reduces mental distress when buyers find lower prices. By offering LPGs, sellers are demonstrating their concern for buyers and allowing buyers to reduce post-purchase regret.

Additionally, consistent seller locations allow buyers to locate sellers and spread negative WOM easily if the quality is lower-than-expected, again showing seller benevolence and willingness to suffer. Since reputation takes time to build and is costly to lose, low-resource sellers that use consistent locations are putting investments in personal reputation at risk.

Sellers of both high-investment and low-investment products can use LPGs, consistent locations, and percentage of credit with ease. For instance, sellers of low-investment products, like fruits/vegetables, can offer LPGs so that buyers can take a refund if fruits/vegetables of similar taste are found from other sellers. Consistent locations can be selected when a low-resource seller sells fruits/vegetables in the same location. This is especially important for street hawkers that sell fruits/vegetables on moveable stalls. Locating such sellers can become difficult. These sellers can choose fixed locations for selling fruits/vegetables. Although fruits/vegetables do not require a percentage of credit due to lower prices, low-resource sellers can offer ongoing store credit that allows buyers to repay later and open a credit account (i.e., buyers can buy many things and then repay at the end of the month or week).

For sellers of high-investment products, like cows/buffalos, buyers can claim LPG refunds if cows/buffalos that provide higher milk are found in the market during a certain period (e.g., within 3 weeks of purchase). The consistent location signal can be used when cows/buffalos are sold at fixed locations in a cattle market. Since thousands of buyers and sellers are present in cattle markets, finding sellers is difficult. Low-resource sellers can ensure that they do not

move around the market and choose a consistent selling point. Since prices of cows/buffalos are high, low-resource sellers can offer a percentage of credit (e.g., allow 20% of the price to be repaid in 2 months).

Hence, the following hypothesis is provided:

Hypothesis # 1B: *When used as signals by low-resource sellers, consistent locations, LPGs, and percentage of credit offered will increase PPS.*

Price Unfairness Perceptions (PUP). As mentioned previously, PUP is another measure to assess the extent of buyer uncertainty. Sellers can take advantage of the limited market knowledge that buyers have, charging excessively. Since buyers have already created expectations of quality based on whatever information is provided by sellers (as discussed previously), signals which allow buyers to compare quality features offered by focal sellers with those offered by other sellers in the market will influence PUP.

It is expected that signals which reflect sellers' tendency to avoid taking undue advantage of buyers' limited market knowledge and allow buyers to easily compare quality features with those offered by other sellers in the market will reduce PUP. Signals which allow a buyer to identify quality features and compare the features with those offered by other sellers can increase buyers' market knowledge. This will reduce buyers' perceptions of the focal seller taking advantage of buyers' limited market knowledge.

Visible investments in product care will decrease PUP for high-resource sellers of both low-investment and high-investment products. For low-investment products, like fruits and vegetables, using product packaging makes salient the valuable features of a product that must be preserved, such as the vitamin or fibre content of fruits/vegetables. Making these features salient will not only increase buyers' product knowledge but will also help reduce PUP. Since the buyer can identify features that can be compared by features offered by other sellers, it becomes difficult for sellers to cheat buyers. Hence, perceptions of seller cheating will decrease.

For high-investment products, like cows and buffalos, visible investments in product care, such as feeding fodder, will serve many purposes. At one end, the signal will help demonstrate quality, since cows/buffalos generate milk. As milking increases, cows/buffalos lose weight. Cows/buffalos that eat large amounts of fodder are healthy and can sustain their weight, prolonging their milking period and reflecting quality. On the other hand, by increasing the salience and noticeability of fodder fed, high-resource sellers will increase buyers' knowledge on how to evaluate product quality. Hence, buyers can easily compare the amount of fodder fed by different sellers in the market, making comparisons easier and reducing price unfairness perceptions of the focal seller.

Hypothesis # 2A: *When high-resource sellers use visible investments in product care as signals, PUP will decrease.*

For low-resource sellers, a different set of signals will reduce Price Unfairness Perceptions. Many signals will reduce PUP. For instance, the percentage of credit offered reduces the likelihood that a seller will charge unfair prices (and take undue advantages) since buyers can learn of the true market price later and refuse to offer the remaining credit amount if cheated. LPGs provide guarantees of sellers reimbursing buyers if prices higher than those in the market are charged. LPGs directly add a penalty if sellers take advantage of buyers' limited knowledge, reducing PUP. Consistent locations show sellers' willingness to accept backlash if unfair prices are charged, reducing PUP and strengthening the role of the WOM mechanism.

Low-resource sellers of both high- and low-investment products can use LPGs, consistent locations, and percentage of credit with ease, as has been discussed.

Hypothesis # 2B: *When used as signals by low-resource sellers, consistent locations, LPGs, and percentage of credit offered will decrease PUP.*

Price. Price is a key outcome. Without a suitable price, sellers will not be incentivized to provide good quality products/services. In informal markets, price is typically negotiated at the end of the transaction when a buyer has estimated quality levels and formed a purchase intention. Negotiating the final price involves haggling with sellers to approach a mutually agreed price. In this stage, the price will be influenced by signals that allow sellers to justify a higher price to cover costs associated with signals.

High resource sellers can use wide distribution networks to justify higher prices for both low-investment and high-investment products. For low-investment products, like fruits and vegetables, high-resource sellers can show the presence of employees who serve specialist functions. For instance, high-resource sellers can have employees that grow fruit, store fruit, transport fruit, package fruit, or maintain quality checks during fruit production. Showcasing the presence of a large number of employees will help justify higher prices.

For high-investment products, like cows and buffalos, high-resource sellers can have vast networks of employees serving specialist functions. For instance, some employees are responsible for feeding fodder, some are responsible for bathing (cows/buffalos require temperature control), some are responsible for transportation, and some are responsible for maintaining health (e.g., providing medicines).

In sum, the presence of a wide network will help high-resource sellers justify higher prices. Additionally, since high-resource sellers value their social status and want to display financial resources and power, they will not risk offering lower-than-expected quality and destroy investments in the signals. Hence, buyers will offer higher prices to sellers that showcase wide distribution networks.

Hypothesis # 3A: *When high-resource sellers use wide distribution networks as signals, the price will increase.*

Low-resource sellers can use a percentage of credit offered to justify higher prices. Since a percentage of credit offered creates costs and risks for low-resource sellers, such as when sellers

are unwilling to pay the remaining amount following the discovery of lower-than-expected quality, the low-resource sellers can suffer huge financial losses. Low-resource sellers can use the threat of losses to justify a higher price. Similarly, offering a percentage of credit allows sellers to show care for the customers and charge a premium, helping sellers negotiate a better, fair price. Low-resource sellers who value their reputation and want to create an emotional attachment with buyers will not abuse the signals, helping justify higher prices.

As discussed previously, low-resource sellers can offer a percentage of credit when selling both high- and low-investment products. Sellers of low-investment products (e.g., fruits/vegetables) can use store credit, while sellers of high-investment products (e.g., cows/buffalos) can allow a percentage of the price to be repaid later (e.g., 20% of the price repaid after two months).

Hypothesis # 3B: *When used as a signal by low-resource sellers, the percentage of credit offered will increase the price.*

4.2.1.3 Impact Of Buyer Learning

Signaling dynamics can change with buyer learning over a period. For instance, buyers over the long term can learn to identify signals and disassociate signals from seller resources. This simply means that buyers will not create expectations based on seller resources. Rather, buyers will only associate expectations with signals received, improving market efficiency and simplifying the signaling process. Although it can be expected that as buyers learn the role of seller resources become irrelevant, the study supports the position that buyer learning will not influence the bias buyers have about the impact of resources on signals.

There are many reasons why buyer learning will not influence the bias buyers have about the impact of resources on signals. Firstly, power and resource inequalities are an enduring part of informal markets. The market dynamics discussed earlier that drive high- and low-resource sellers to choose unique positioning strategies are a natural part of informal markets. Until drastic measures are taken to reduce resource inequalities and power differentials, sellers that

possess more resources will remain vital to progress in informal markets, while sellers with lesser resources will continue to create emotional bonds to retain social importance. In turn, the different social roles will lead to different business outcomes and strategies, as discussed previously.

Secondly, the original signaling literature mentions the possibility of having multiple separating equilibriums based on seller characteristics (Akerlof 1970; Spence 1973). In many markets, non-alterable seller characteristics (e.g. race, age, etc.) can be associated with expectations. Multiple separating equilibriums can exist due to the feedback loop. As discussed before (see Chapter 2), when buyers interact with signals overtime, a feedback loop is created, attaching expectations with signals. Since resource inequality in informal markets is an enduring phenomena, any feedback loop must also incorporate expectations associated with resources. As a result, informal market buyers will attach different expectations based on seller resources.

Hypothesis # 4: Increase in duration of buyer learning will not eliminate the impact of resources on signals.

After having discussed the hypotheses for the PR and EB signals, a potential mediation relationship is discussed next.

4.2.1.4 Mediation Relationship

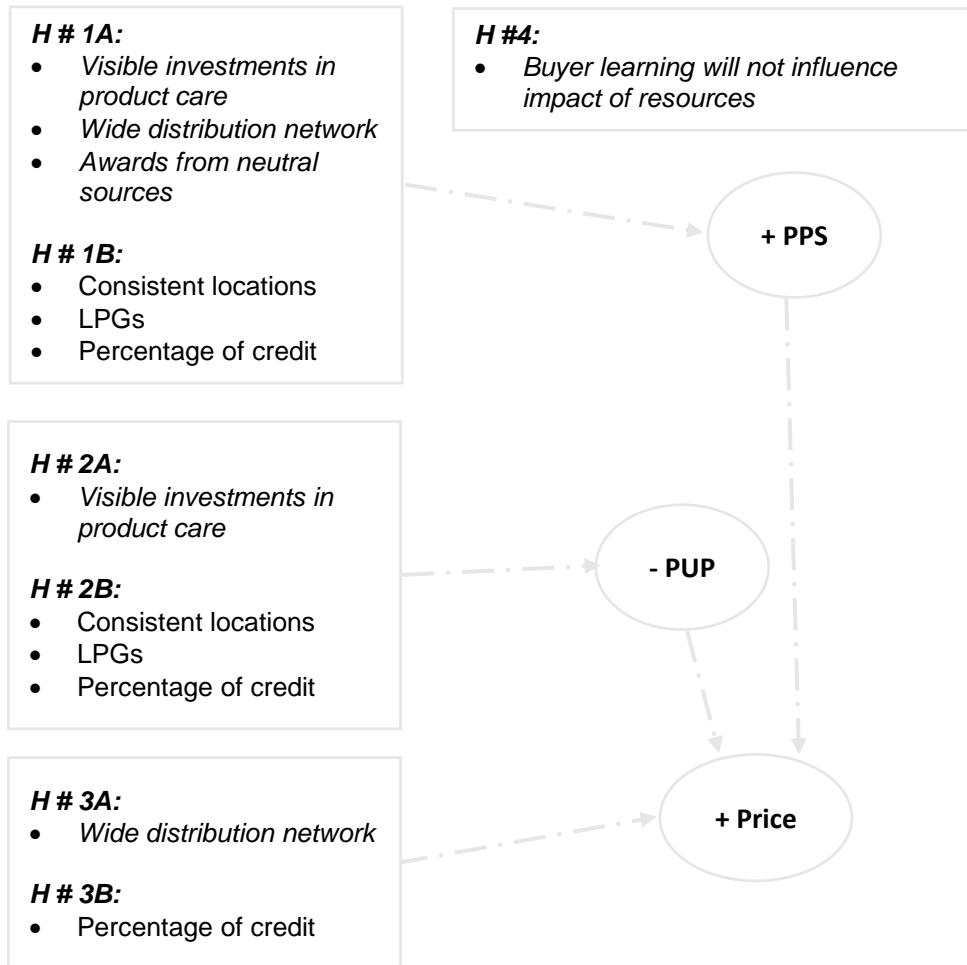
A question that arises is, does a mediation relationship exist between PUP, PPS, and price, with both PUP and PPS influencing price? For instance, Perceived Purchase Safety should lower a buyers' perceived risk, leading to higher seller payoff as an incentive to maintain the beneficial seller behavior. Similarly, if buyers believe that price is commensurate with the quality, buyers might be willing to pay a higher price as an incentive to maintain seller behavior. The literature on Signaling Theory seems to support this view. For instance, Akerlof (1970) and Spence (1973) show that signals become associated with rewards over time. These rewards are necessary to create a separating equilibrium, incentivizing signal senders to maintain their behavior. If signals are not rewarded, signals might fail.

However, signals may be associated with different outcomes which do not lead to a higher price. For instance, advertising expenses decrease buyers' financial and privacy risks in online settings, although perceived performance risks (Biswas and Biswas 2004) or perceptions of seller benevolence, credibility, or trustworthiness are unaffected (Aiken and Boush 2006). While advertisements do not improve seller credibility or perceived performance in the examples above, Du and Osmonbekov (2019) show that advertisements increase firm value by increasing shareholders' firm valuations. Taken together, the examples from advertisement studies show that signals can produce beneficial outcomes, but these benefits might not translate into higher prices. If the above studies which mention that signals can produce beneficial outcomes without affecting price are connected with studies (Akerlof 1970; Spence 1973) that show how signals become associated with rewards, it can be inferred that signaling can lead to only non-monetary rewards too, such as greater credibility or higher price fairness perceptions.

Since signals reflect market expectations that are created through a feedback loop over time (Spence 1973), some signals can be associated with financial rewards, like a higher price, while others can be associated with non-financial rewards, like higher credibility or price fairness perceptions. Hence, signals associated with PPS and PUP can be separate from signals that are associated with a higher price, due to different expectations created over time. Hence, a mediation relationship between PPS, PUP, and price is not hypothesized. *It is expected that an increase in PPS and a decrease in PUP will not lead to a higher price. Rather, the three outcomes are treated differently.*

Figure 4.1 provides an overview of signals, outcomes, and their relationships.

Figure 4.1. Overview of the hypotheses and their relationships



This chapter created hypotheses between signals and their impact on outcomes, showing a critical component of the market process. The hypotheses are based on the new signaling framework that was presented in Chapter 3 and that classifies signals into those that can be enabled by word of mouth and those that cannot be enabled by word of mouth. Furthermore, by categorizing signals that can be enabled by word of mouth into PR/EB categories, it is easier to identify the impact of seller resource levels on signal usage. The chapter also identifies signals that will not have any impact on outcomes, since the propagation mediums that enable the signals are absent. Testing the hypotheses using data collected from a field study in a cattle market, the study will attempt to understand how signals can affect the three key outcomes and propose optimal signaling strategies that combine the benefits of the signals while minimizing the adverse

effects of signals across outcomes. In Chapter 5, details of the data collection strategy are provided.

Chapter 5: Research Methodology

To improve market efficiency, efforts must be made to improve the market process by addressing each of the components in the process. In Chapter 1, it was discussed that the goal of the study is to determine how informal market sellers can use signals to achieve three key outcomes - increasing credibility/reliability, decreasing price unfairness perceptions, and increasing price. Successfully achieving the three outcomes lowers buyer risk and increases seller profits. Before providing optimal signaling strategies for sellers, a greater understanding of signals and their applications in informal markets is required. Hence, Chapter 2 discussed the signals and their applications in informal markets, with Chapter 3 categorizing signals based on propagating mediums that enable/impede the signals and discussing the unique informal market dynamics that influence signaling strategies. Specifically, Chapter 3 showed that signals in informal markets are enabled by word of mouth and that signaling strategies vary with seller resource levels. In Chapter 4, a series of hypotheses were presented. The hypotheses predicted relationships between signals, the three key outcomes, and seller resource levels. The hypotheses and the relationships will be tested using empirical models from field study data in Chapter 6.

In the current chapter, details of the data collection and research methodology are provided. The chapter starts by providing an overview of the empirical context. Then, a scoping-phase study is discussed followed by the measures adopted for all variables in the study.

5.1 Empirical Context

The context of this study is the Model Cattle Market Sheikhpura. This cattle market is located on the outskirts of Sheikhpura city, Pakistan. In the past, the cattle markets in Pakistan were leased to private contractors, who charged exorbitant prices for providing basic services to buyers/sellers (e.g., food, water, parking, security, etc.), and in facilitating buying/selling in the cattle market

(e.g., fees for loading/off-loading cows/buffalos, higher prices for feeding fodder or providing veterinary services to cows/buffalos). However, these private contractors abused their power and extracted high prices from buyers/sellers in the market, decreasing the utility of the markets. To end exploitation, the government decided to end the role of the private contractors.

On April 2nd, 2015, all the cattle markets in the province of Punjab were taken into possession of the Punjab government, including the Sheikhpura Model Cattle Market (Local Government and Community Development 2015). The cattle market was modernized as part of the government's initiative to provide modern trading facilities for buyers and sellers. After taking possession of the cattle market, semi-government organizations were developed to administer the cattle markets. The semi-government organizations worked in collaboration with the Punjab government and employed private employees that worked closely with government employees in administering the cattle markets.

Together, several improvements have been observed in the Model Cattle Market Sheikhpura (Local Government and Community Development 2015). Firstly, free basic facilities are provided to buyers and sellers, such as water, electricity, veterinary services, shade (sheds), loading and unloading services, parking, security, cleanliness, and toilets. Secondly, many facilities are outsourced through a competitive bidding process. The facilities outsourced include fodder shops, canteens, hotels, tea stalls, ornamental shops, lodging, and boarding. An attempt has been made to modernize the Model Cattle Market Sheikhpura by initiating several projects, such as (1) animal registration using ear tags to improve animal traceability, (2) installation of promotional billboards to generate revenues, (3) organizing livestock competitions in collaboration with USAID and Pakistan Livestock Breeder Association to encourage breed improvement, (4) introduction of banking facilities to decrease non-cash transactions, and (5) installation of Solar Systems and Biogas Systems to enable the cattle market to fulfil its energy needs.

However, based on information gathered from interviews and observations during this study, the changes in the cattle market have not materialized as expected. While promotional billboards are installed, little use of advertisements is observed, since the sellers are unwilling to use advertisement services, perhaps to avoid making their businesses salient and attract the attention of tax authorities. Animal registration was started but ended abruptly after a trial project, mainly due to the unwillingness of the buyers/sellers to allow their cows/buffalos to be tagged. The tags are sold at a small price. The buyers/sellers deemed these prices excessive, showing how small costs weigh highly on informal market sellers that have meagre incomes. Many competitions were held to encourage breed improvements; however, no breed improvements have been observed to date. The introduction of banking facilities failed, mainly since the banks thought that buyers/sellers will use the facilities to withdraw cash only, creating unsustainable losses for the banks. It is worth noting that the people in the Sheikhpura Model Cattle Market, like all other cattle markets in Pakistan, are habitual tax evaders. Being part of the banking system will make it easier for the government to tax the buyers/sellers in the cattle markets. Hence, buyers and sellers resist banking facilities in the cattle markets.

In this market, the only positive change that the government's possession brought is that private contractors who charged exorbitant prices (see above) have been eliminated and basic facilities are provided to buyers and sellers. However, the government does not interfere in buying/selling in the market. No regulatory authorities or consumer legal protection services are present: the government only provides basic facilities which make trading in the market more comfortable, such as providing canteens, cleanliness, toilets, and parking. The government intervention does not address issues of adverse selection or resource inequalities that are the focus of the study. As such, this market is an excellent context for this study.

More specifically, to understand the impact that signals can have on the three key outcomes and to test the impact of resource levels on signal usage, a study context was required that fulfilled the following criteria.

1. The context must contain high levels of adverse selection.
2. No formal mechanisms (e.g., regulatory authorities) should exist that protect buyer rights.
3. Costs of faulty product purchase should be high for the buyers.
4. High resource inequality and power differentials must exist.

All the study context criteria are fulfilled in the Model Cattle Market Sheikhpura. However, there are several other key reasons why the study has been conducted in the Sheikhpura Model Cattle Market (*hereafter referred to as “the cattle market” or “the market”*):

- 1) The market is renowned for trade in cows and buffalos. The cows and buffalos traded are milk giving (i.e., they are not worn out and not traded for slaughtering). The cows and buffalos are traded mainly so that milk can be extracted. Additionally, the cows and buffalos generate dung which is used as fuel in rural households. The cows and buffalos are also used for farm work. Due to the high utility of the cows and buffalos and their impact on creating revenues (e.g., by selling milk), the impact of faulty purchases and adverse selection is extremely high.
- 2) The unobservable product quality of cows and buffalos is extremely important. Since cows and buffalos are traded for milking purposes (e.g., selling milk to gain revenues), they represent a long-term investment (opposed to cows or buffalos that are meant to be slaughtered and used for immediate consumption).
- 3) The unobserved product quality of the cows and buffalos is not evident. In developed countries, some mechanisms ensure that cows and buffalos are properly vaccinated, fed, etc. There are breeder associations or government departments that keep records of cows and buffalos. When the cows/buffalos are traded, new buyers have access to these records. With these records, buyers can create accurate quality expectations. If there are post-purchase problems, buyers can contact legal authorities for compensation or help. In the cattle market – and Pakistan as a whole - mechanisms to record the history of cows/buffalos are absent. A buyer has no access to objective information when buying from a cattle market in Pakistan. Not only are the buyers

“blind”, but there is also no legal authority that can help in case quality is lower-than-expected. As a result, the buyer must bear the entire risk of purchase.

- 4) The buyers and sellers who trade mostly come from rural areas, where incomes are extremely low, and markets suffer from the highest levels of adverse selection issues due to poor infrastructure and lack of legal oversight (Minoia and Pain 2017). Half the Pakistani population lives near the poverty line, with the highest poverty levels in rural areas. Thus, purchase risks are high for buyers in the cattle market. For buyers in the cattle market, a cow/buffalo represents a huge investment. Lower-than-expected quality can decrease family revenues derived from selling milk, casting a serious impact on family finances.
- 5) It is quite easy for sellers to manipulate the quality of cows/buffalos since true product quality is revealed only later (mostly a week after purchase). For instance, by oiling a cow/ buffalo or cutting the horns short, the cow/buffalo looks younger. This can affect quality perceptions since cows/buffalos that are younger have more pregnancy cycles ahead, and consequently, higher milk production potential. To further disguise quality, sellers can make the udders look fatter than they are by not milking cows/buffalos many days before bringing them to the market. On average, a cow/buffalo is milked once or twice a day. By not milking, the udders can look fatter due to the previously accumulated milk and can give an impression of healthier cows/buffalos. Additionally, if sellers do not allow buyers to extract milk from the udder of cows/buffalos in the cattle market more than a few times, the buyers cannot create an idea of the frequency with which the cows/buffalos generate milk. Further adding buyers’ ignorance of whether cows/buffalos are diseased or not (many diseases can stop milk production and transfer themselves to other cows/buffalos in the vicinity), buyers are essentially “blind” when making purchases. This represents a huge adverse selection problem.

Thus, the cattle market was chosen because it fulfils the selection criteria due to the prevalence of adverse selection, lack of legal buyer protection, high buyer purchase risk, and high resource

inequality and power differentials. The field study was conducted after a Warwick Strategic Research Fund award of GBP 11,564 was awarded. The following exhibits show a glimpse of activities in the cattle market of study.

Exhibit 5.1 shows an aerial view of the cattle market. In the cattle market, around 1500-2000 buyers and 1000-1500 sellers meet to trade in cows/buffalos. The cattle market operates one day each week (on Saturdays). After the buying/selling activity ends each Saturday, the buyers/seller return to their villages. Buying/selling starts early in the morning around sunrise and continues until late afternoon. Due to the need to buy/sell and return to the distant city/villages at the earliest, a sense of urgency prevails in the market. Thus, buying/selling is very hectic in the market. Moreover, since banking facilities are not available, buyers carry a lot of cash with them. To avoid being robbed or misplacing their money, buyers always attempt to purchase cows/buffalos at the earliest and return to their distant city/villages before evening, when chances of being robbed in isolated roads are higher.

In the lower parts of Exhibit 5.1 (south side), the 8 entrance gates that connect the market to the parking area can be seen. The circular clearing in the middle of the picture shows the auction ring, where competitions are held. On the upper part of Exhibit 5.1(north side), a relatively barren area with a large gathering of buyers/sellers can be seen. Usually, more relaxed negotiations take place in this area. Many tea stalls and the only fodder shops in the market are present in this area, showing that people tend to have more relaxed conversations around tea stalls and canteens.

Exhibit 5.1 *An aerial view of the cattle market*



Exhibit 5.2 shows a lower-level bird's eye of view of the cattle market. The auction ring and many of the sheds where the cows/buffalos are placed can be observed.

Exhibit 5.2 *A lower-level bird's eye of view of the cattle market*



Exhibit 5.3 shows a seller inside one of the sheds applying oil to a buffalo. By oiling the cows/buffalos, sellers can conceal quality, making the cows/buffalos appear younger and hence likely to provide milk for a longer period.

Exhibit 5.3 A seller inside one of the sheds applying oil to a buffalo



Exhibit 5.4 shows a seller cutting short the horns of a cow. By cutting the horns of the cows/buffalos, sellers can conceal quality, making the cows/buffalos appear younger and healthier.

Exhibit 5.4 A seller cutting short the horns of a cow



Exhibit 5.5 shows a seller allowing the buyer to milk a buffalo. By allowing milking, sellers can allow buyers to assess the quality of the cow/buffalo being sold.

Exhibit 5.5 *A seller allowing the buyer to milk a buffalo*



Exhibit 5.6 and Exhibit 5.7 show the differential use of fodder as a signal. While some sellers are seen feeding large amounts of fodder, other sellers prefer to feed fewer amounts of fodder. Many buyers also prefer to inspect cows/buffalos when they are hungry, as mentioned before. Exhibit 5.6 also shows the tendency of some sellers to decorate the cows/buffalos.

Exhibit 5.6 *Cows being fed large amounts of fodder*



Exhibit 5.7 *Cows not being fed any fodder*



After having discussed the empirical context of the study and providing an overview of the cattle market, a scoping-phase study that was conducted in the cattle market is discussed.

5.2 Scoping-Phase Study

Before initiating the data collection for empirical analysis, a scoping-phase study was conducted over 3 months. The purpose of the scoping-phase study was to develop an initial understanding of the cattle market since no data in our knowledge exists that approaches a cattle market from the perspective of buying/selling. It was expected that insights from the scoping-phase study will help pinpoint the exact source of market inefficiencies and identify patterns in buying/selling dynamics that might be contributing to high adverse selection. Furthermore, it was expected that the scoping-phase study would help in identifying variables for the study and developing hypothetical relationships between variables and outcomes. In this regard, the scoping-phase study did reveal many interesting insights that show informal market dynamics that are far different from those observed in the developed economies, and from those which may be expected purely based on theory.

To generate an initial understanding of the cattle market, several approaches were adopted.

1. Interviews with many stakeholders were conducted. The stakeholders include buyers, sellers, local university professors that have been investigating the cattle market, administrators of the cattle market, field staff that operationally manage the cattle market, and government officials from the Livestock Department that are charged to improve the cattle markets. Detailed one-to-one and individual interviews were conducted and recorded for later analysis.
2. Observations of buyer/seller behavior and market dynamics were recorded. To conduct the observations, the researcher used to visit the cattle market early in the morning and used to observe the times in which buyers/sellers came to the market, the areas that the buyers/sellers preferred to occupy, the method of negotiations, and the overall activities in the cattle market.
3. The role of a buyer was adopted to understand the trading and negotiation dynamics. For this purpose, the researcher posed as a buyer and interacted with many sellers. During the interactions, the researcher noted the negotiation tactics of the sellers, and their tendencies to increase prices or use signals. Many of these insights are later used in the interpretation of the results.
4. Gathering insights from secondary data. The researcher tried to get access to the existing database that is maintained by the Livestock Department (part of the Punjab government) to unravel insights. However, despite repeated requests for access to data, the Livestock Department did not respond. The researcher tried to gather as much secondary data as possible from pages owned by sellers of cows/buffalos, government websites, breeder association websites, and other printed/video material relating to cows/buffalos.

The results from the scoping-phase study reveal many insights. These are discussed next.

5.2.1 High Adverse Selection And Importance Of Relationships

The results confirm the proposition that cattle markets suffer from high adverse selection. Generally, the buyers have little confidence in the quality of cows/buffalos sold and recall having bought cows/buffalos of poorer quality than that is claimed by the seller. To reduce their purchase risks, buyers prefer to establish relationships with sellers before buying or buy from close relationships. Additionally, many buyers prefer to avoid buying from the cattle market and prefer to buy directly from people who have excess cows/buffalos on their farms.

The buyers strongly believe that the best way to ensure that high-quality cows/buffalos are bought is to use old customer references to establish seller credibility. The reputation of sellers reflects the quality. The highest quality sellers are the ones who come to the cattle market each week and are very sensitive to the possibility of negative word of mouth. The low-quality sellers do not come to the cattle market each week. This supports the earlier view that reputation is vital in informal markets. Moreover, high-quality sellers are sensitive to word of mouth that can damage hard-earned seller reputation, lending support to the view that word of mouth is the propagation medium for signals in informal markets.

5.2.2 Presence Of Power Differentials

The results confirm the presence of high-power differentials, with rich and powerful sellers exerting influence in the market and occupying a position of respect and importance compared to low-resource sellers. The tendency of buyers to interact with and converse with the high-resource sellers is high, lending support to the analysis in Chapter 2 and Chapter 3 which suggest that when lower-than-expected quality is provided by high-resource sellers, informal market buyers are unlikely to cut social ties with high-resource sellers. On the other hand, since low-resource sellers occupy a position of unimportance in the cattle market, delivering products of inadequate quality can lead to social isolation.

5.2.3 Importance Of Consistent Locations And Visible Investments In Product Care

The scoping-phase study reveals the importance of consistent selling locations and visible investments in product care, lending support to the novel signals presented in the new framework (Chapter 3). Consistent with hypotheses in Chapter 4, by choosing consistent selling locations, sellers show their willingness to face buyer backlash in future trading sessions. Only high-quality sellers choose consistent locations. However, low-quality sellers do not come to the market each week and are difficult to locate, showing the difference in choosing consistent locations for sellers with different quality types. Sellers that choose consistent locations are known to have the best quality cows/buffalos and receive pre-orders. Their consistent location is seen by many buyers as a guarantee. Sellers that choose consistent locations engage in lots of preannouncement behaviour, although they do not preannounce price.

Buyers and sellers believe that the best sellers are good at negotiations. Hence, the best sellers do not reveal the price in advance. This contrasts with the literature on preannouncements discussed in Chapter 2 and Chapter 3. It was mentioned that preannouncements gain credibility when price information is provided. Furthermore, preannouncements function when the information provided is specific and unlikely to change. Given the tendency of sellers to omit price information during preannouncements and negotiate after preannouncements are made, it is quite likely that the preannouncement signals will not work, opposite to the hypotheses in Chapter 4.

Visible investments in product care are also an important signal, consistent with the new theory framework presented in Chapter 3. In cattle markets, visible investments in product care can take the form of expensive fodder for cows/buffalos. Trade in the cattle markets involves expensive cows/buffalos that are traded primarily for milk generation, requiring expensive fodder to maintain the health of cows/buffalos. Hence, visible investments in product care can take the form of fodder fed in the cattle markets. Feeding fodder acts as a signal for many reasons. Firstly, fodder is expensive. When cows/buffalos eat

large amounts of fodder, it reflects the health and quality of cows/buffalos. Eating fodder allows cows/buffalos to gain weight. When cows/buffalos start their milking season, they lose weight. Hence, for cows/buffalos to sustain their health during milking, they must eat large amounts of fodder to maintain weight. A cow/buffalo that does not eat fodder is deemed sick.

Fodder fed helps to create a separating equilibrium. Since fodder is expensive, sellers of lower quality will not spend large amounts of money on fodder. Such sellers will spend the minimum amount on the cows/buffalos, maximizing profits. Sellers who are confident of higher quality will invest more in fodder since they will recover their investments through future sales once the true high quality of cows/buffalos is revealed. This insight seems to support the utility of the novel signals provided in Chapter 3.

While fodder fed acts as a signal, it can be abused. During the scoping phase study, it was discovered that some sellers mix spices with fodder to stimulate greater hunger in cows/buffalos. Overeating makes lower-quality cows/buffalos appear fatter, mimicking cows/buffalos of high-quality sellers. After the dishonest sellers sell cows/buffalos fed with special hunger-inducing spices, cows/buffalos reduce eating a few days later, revealing their low quality. Even though the dishonest sellers invest in feeding special spices and extra fodder, they can delude buyers and gain high profits to cover the extra costs. To avoid seller deception, many sellers in the market prefer to inspect cows/buffalos when they are not fed.

5.2.4 Use Of Signals Not Sustained By Word Of Mouth

During the study, it was learned that some signals are used by sellers, even though they are not sustained by word of mouth. These are discussed as follows. These include product guarantees, providing competitor quality information, and using auction method to state price.

Most sellers do not offer any product guarantees, citing potentially irresponsible buyer behavior in dealing with “alive” products. This seems to support the view mentioned in Chapter 2 and

Chapter 3 that the presence of consumer moral hazard and seller reliance on credit, coupled with the absence of legal authorities, makes product guarantees an infeasible signal. However, some sellers do offer product guarantees. As hypothesized in Chapter 4, signals sustained by alternative propagation mediums (i.e., other than word of mouth) will not function. Hence, product guarantees will not affect any outcomes.

Some sellers provide competitor quality information. In Chapter 3, it was theorized that providing competitor quality information will not function as a signal since the signal requires an information-technology-driven format that allows prices and information to be presented in a comparative format. However, during the scoping-phase study, it was observed that this signal is used by many sellers. However, as hypothesized in Chapter 4, the signal will not function since it cannot be sustained by word of mouth. Hence, providing competitor price information will not affect any outcomes.

Auction method to state price. In the cattle market, many buyers believe that the most credible sellers, instead of quoting a price upfront, gather potential buyers and ask them to bid the highest price. This is known as the auction method to state price. A separating equilibrium is created since low-quality sellers will not want many buyers to observe the cow/buffalo and quote a price since closer inspection can reveal low quality. Only high-quality sellers can use this signal and create perceptions of high quality.

This signal is a variation of the minimum starting bid (MSB) signal that was discussed in Chapter 2. The MSB involves a seller stating a minimum price, while the auction method in the cattle market does not involve sellers stating a minimum price. While it might seem that differences between the two are trivial and the positive seller quality perceptions created by MSB (Srinivasan and Sun, 2009) should also be created for auction methods, this is not always true. Sellers manipulate the process when sellers' close associates pose as buyers and raise the bidding price, creating perceptions of higher quality for unsuspecting buyers. Hence, shrewd sellers can deceive buyers into paying more than what the true quality is worth. Since

using auction method does not require financial investments, this is an EB signal that low-resource sellers will use.

5.2.4 Presence Of Pseudo-Signals

During the scoping-phase study, many signals in use were uncovered that can be labelled as pseudo-signals. Although all signals should be manipulated, certain signals can be manipulated at very low costs, reducing their signaling impact. Pseudo-signals are such signals which can be manipulated at very low costs by low-quality sellers, creating a seller equilibrium with high-quality sellers. Two such signals are widely used in the market. These are *Milking allowed* and *calves attached*.

Milking allowed. During the scoping phase study, many buyers mentioned that most credible sellers allow buyers to milk cows/buffalos. This is a form of product trial. By milking, buyers can observe first-hand the milk quality and inspect the cows'/buffalos' health. For instance, buyers can observe the amount of milk given (in litres), the thickness or whiteness of the milk, etc. Since cows/buffalos are bought for farm use (such as dung for fuel or milk for family) or selling milk to generate revenues, cows/buffalos are investment products. Observing milk quality creates expectations of cows'/buffalos' quality. Although it seems straightforward that milking creates a separating equilibrium, since only high-quality sellers will show the true quality of their cows/buffalos, the signal is abused.

During the scoping phase study, it was discovered that buyers viewed milking with skepticism, since (1) shrewd sellers stop milking their cows/buffalos a few days before bringing them to the market or (2) inject fake milk into the udders of cows/buffalos at very low costs. In this way, low-quality sellers can delude the buyers and make the product trial experience less credible. Hence, cows/buffalos produce extra milk in the market but return to their lower milk giving capacity a few days after purchase. Overall, fraudulent practices are prevalent in the market, and milking as a signal is treated with skepticism. For this reason, milking can be labelled as a pseudo signal. Due to the absence of costs in producing the signal, it is categorized as an *EB signal*.

Calves attached. During the scoping-phase study, it was observed that many sellers attach calves (newborn cows/buffalos) with cows/buffalos being offered for sale. Through this signal, buyers believe that cows/buffalos offered for sale successfully produced offspring. Since cows/buffalo start their milking season after successfully reproducing, and cows/buffalos that reproduce demonstrate good health and quality, producing offspring should act as a signal of quality. Additionally, attaching calves requires many members. For instance, members are needed to clean/bath the calves, feed the calves, oil the calves, walk the calves, and provide medical care. Thus, having calves attached requires a wide network of caretakers and specialists, etc., allowing to capture the effect of wide distribution networks. In the study, calves attached will be used as a measure to capture the effect of a wide distribution network, which should positively influence outcomes for high-resource sellers, as discussed in Chapter 4.

It is important to note that the signal is abused when offered by low-resource sellers, consistent with the analysis in Chapter 2 and Chapter 3, which suggests that PR signals used by low-resource sellers will not function. Many sellers attach fake calves with cows/buffalos. Some sellers employ methods that create emotional bonds between a cow/buffalo being offered for sale and a random calf, creating an appearance of interrelatedness, and deceiving buyers into thinking that the cow/buffalo offered for sale produced an offspring. Many people sell random calves outside the market that are then falsely attached with cows/buffalos inside the market to delude buyers. Hence, many buyers view calves attached with skepticism.

While calves attached in theory can create a separating equilibrium, low costs of buying fake calves and attaching these with cows/buffalos allow fraudulent sellers to raise prices and gather high profits. For this reason, the calves attached can be labelled as pseudo-signals. However, it is expected that the calves attached are perceived as pseudo-signal when used by low-resource sellers only. Since high-resource sellers have a high status and position to maintain in society, calves attached will not be seen as a pseudo-signal. Rather, maintaining and caring for calves (e.g., feeding, bathing, medical treatments, etc.) requires the presence of a wide distribution network.

The presence of calves will act as a demonstration of a wide distribution network of the seller, making this a *PR signal*.

5.2.5 Utility Of The Scoping-Phase Study

The scoping-phase study provides initial insights into the informal market. The insights proved instrumental in creating the novel signals in Chapter 3 and in recognizing the importance of word of mouth as the propagation medium. Furthermore, insights from the scoping-phase study, especially the differential treatment provided to sellers with different resource levels, helped identify the role of resource levels in not only creating different outcomes, but also the need for sellers to signal their social positions. The scoping-phase study helped identify the presence of pseudo-signals, which reflect the inefficient use of signals. The prevalence of pseudo-signals can explain the low buyer confidence in the market.

The scoping-phase study helped in identifying market dynamics that can complicate the use of certain signals. For instance, prices do not seem to act as signals, consistent with the analysis in Chapters 2 and 3. In the market, sellers tend to overquote the prices of cows/buffalos, especially when facing inexperienced buyers. Since sellers can get higher profits by selling at higher prices, they can leave the market altogether, failing high price as a signal (see Chapter 2). Hence, buyers treat prices as signals with skepticism. Additionally, most sellers do not offer LPG, showing that LPGs are less prevalent.

Furthermore, the heavy dependence of sellers on credit to purchase cows/buffalos and sell these in the market makes it difficult to reimburse buyers when offering product guarantees. This is consistent with the analysis in Chapter 3 and Chapter 4, showing the necessity of legal authority to enable product guarantees. Sellers tend to bet on market prices: many sellers buy cows/buffalos on credit and sell the cow/buffalo immediately in hope that market prices will rise. Such sellers are mostly low-resource sellers that are looking to make quick profits, creating potential distrust for low-resource sellers in the market.

Furthermore, many sellers in the market do not choose consistent locations, rather, they prefer to move around the market. Since the market of study represents a negotiation-based context where buyers and sellers haggle over prices, many buyers and sellers move around the market to gather market information, increasing market knowledge and expertise. So, choosing consistent locations is not associated with seller credibility/reliability. Instead, consistent locations lower purchase risks by allowing the spread of negative word-of-mouth, as hypothesized.

Similarly, due to the presence of a negotiation context, many buyers expect the sellers to conceal information that can be used in negotiations. For instance, many buyers think that the most credible sellers do not preannounce the price of the cow/buffalo in advance, whereas sellers that preannounce price in advance are seen as novices and immature. This supports analysis in Chapters 2 and 3, suggesting that reversibility of preannouncement information reduces the utility of the signal.

Additionally, literature in Chapter 2 and Chapter 3 showed that sellers who provide competitor quality information are seen as benevolent. However, in the cattle market, it was observed that such sellers are viewed negatively. The reason for this behavior is that due to inequality and power differentials, a competitive mindset dominates the market, reducing expectations of helping others (Jachimowicz et al, 2020). Sellers who are seen helping the buyers are seen to be violating the norms of trade in the informal markets.

5.2.6 Need For Supplementary Analysis

As discussed previously, several signals have been uncovered during the scoping-phase study. Some of these are not enabled by word of mouth, while others are classified as pseudo-signals. Since the present study is the first of its kind, the study must explore the impact of these signals on the three key outcomes.

Signals not enabled by word of mouth. The scoping-phase study identified three signals that are not enabled by word of mouth. These are product guarantees, providing competitor quality

information, and using auction method to state price. As mentioned previously, a product guarantee requires the presence of legal authorities to function, while providing competitor quality information and auction method to state price require the presence of an information technology interface to provide information in comparative formats and prevent abuse of signals. Hence, it is expected that none of the three signals will have any impact on the three key outcomes discussed in Chapter 4. Each of the three signals can be classified as *EB* signals due to the absence of financial investments in creating the signals.

Pseudo-signals. The scoping-phase study also uncovered two pseudo-signals. Although all signals must be alterable, these two signals can be altered at very low costs, creating a pooling equilibrium. The two signals are milking allowed and calves attached. As mentioned before, milking allowed can be easily manipulated, although it is a form of product trial. It is prevalent in the market and associated with fraudulent practices. Market expectations for this signal are very poor. Hence, it is expected that milking allowed will not positively affect the three key outcomes.

Calves attached can also be easily manipulated as a signal. As mentioned before, low-resource sellers can attach fake calves at very low costs, deluding buyers. However, calves attached act as a signal for high-resource sellers since their social status and financial resources do not create impressions of cheating. Since the maintenance and care of calves require a wide network, this signal will show the impact of wide distribution networks for high-resource sellers (see Chapter 3 and Chapter 4).

Thus, it is expected that none of the three signals enabled by alternative propagation mediums, along with milking allowed, will positively impact the three key outcomes. On the other hand, calves attached acts as an opportunity to measure the impact of wide distribution networks. The impact of calves attached is like the impact hypothesized for wide distribution networks on the three key outcomes in Chapter 4.

In sum, the scoping-phase study facilitated in identifying variables of interest, understanding the relationship between signals, resource levels, word of mouth, and reputations, revealing critical differences in social norms that can influence the interpretation of signals, and unraveling the prevalence of certain signals. After having discussed the scoping-phase study, the data collection strategy is discussed next, followed by a discussion of the measurements for all the independent, dependent, moderation, and control variables.

5.3. Empirical Data Collection

In this section, the data collection strategy is elaborated. First, the data generation process is discussed, followed by a discussion of the adequacy of the sample size and the efforts to address potential measurement errors.

5.3.1 Data Generating Process

The data was generated from a field study in the Sheikhpura Model Cattle Market in Pakistan through dyadic surveys of both buyers/sellers after a transaction. The data was collected over 10 weeks between February 2019 and July 2019. As mentioned previously, since the cattle market operates on Saturdays only, the 10 data collection days were spread over 10 weeks. Each day, 10-12 teams of interviewers (each team had two researchers) were assigned different areas in the cattle market. When a purchase occurred in a team's area, team members met **both** the buyer and the seller. If **both** the buyer and the seller agreed, interviewers asked questions. The interviews took around 15-18 minutes each for the buyer and the seller. After the interviews ended, both the buyer and the seller were given participation incentives and thanked. An interview with one pair of buyers and sellers is recorded as one **observation**. A total of **1073** observations are recorded (i.e., 1073 buyer and 1073 seller interviews). Since no panels or respondents are being followed over different periods, the data is classified as **cross-sectional**.

There are many reasons why a time-series design was not adopted. Firstly, the focus of the study was on determining the average

effect in the population. The study aimed to learn how signals impact outcomes. To have a measure for the average population, a large random sample was required. However, if a panel was chosen, then researchers would need to interview all sellers that a buyer chose, regardless of whether a sale was made or not made. Since a buyer can meet dozens of sellers in the market, surveying so many sellers is not feasible. Secondly, choosing a panel of 10-15 selected buyers from a varied population of 1500-2000 buyers creates difficulties in generalizing results, reducing the utility of the study. Thirdly, buyers and sellers were skeptical of data collection motives. They thought that the objective of the study was to introduce taxation. Hence, buyers and sellers were generally unwilling to cooperate, making time-series data collection difficult.

Having cross-sectional data can theoretically create limitations in the study. However, many steps were taken to address these limitations. Firstly, due to the cross-sectional data, actual purchase quality was not assessed. For instance, at the time of transactions, buyers were asked questions about PPS, PUP, and price (discussed later). However, data could not be gathered on post-purchase quality. It takes a week for the buyers to learn of a cow/buffalos' true quality. Due to privacy reasons, the researchers were not allowed to trace the buyers. The absence of data on post-purchase quality does not influence the study results. Akerlof (1970) posits that when studying signals, a snapshot of market expectations is being viewed. These expectations are created over time through repeat interactions of market participants.

In the context of the study, the impact of signals on the three key outcomes reflects the market expectations created over time due to the interaction of signals and market participants. The expectations incorporate the experiences of buyers with products and signals in the past. The expectations include buyer perceptions of signals and the post-purchase quality that was discovered in the past. Through the present study, it is possible to assess the expectations that buyers have regarding signals based on experiences that buyers have had with signals and post-purchase product quality in the past.

Secondly, another limitation of the cross-sectional research is the inability to determine the impact of buyer learning over a period.

For instance, a buyer can come to the market in period 1, learn new information and then apply new knowledge in period 2. However, the present study overcomes this limitation by including various measures for buyer learning (see section 5.4.3), such as duration of buyer-seller relationships, buying from the seller before, and buyer-seller sharing same city/ethnicity. Hence, any impact of buyer learning will be controlled in the study.

It is important to interview both buyers and sellers together for many reasons. Firstly, no prior information exists about the buyers or the sellers. All information had to be collected during the interviews to control for potential factors that might affect the study. Secondly, questions were asked from buyers concerning the sellers from whom they purchased cows/buffalos, so that information could be gathered on specific signals that buyers received. Thirdly, questions about signals were asked from both the buyers and the sellers to learn which signals the two parties claimed to send and receive. A potential bias can result when buyers are asked questions regarding sellers when sellers are present in the vicinity. However, this bias did not occur. The trading in the market was very hectic. Buyers and sellers carried cash (no banking facilities are used in the market). Due to the urgency to buy/sell and leave the market for distant locations before evening, buyers/sellers separated after making the transaction. Hence, it is quite unlikely that buyer responses are influenced by the presence of sellers.

5.3.2 Sample Size

Each trading day, around 1000-1500 sellers and 1500-2000 buyers visit the cattle market. Each trading day, around 100-115 purchases were recorded by interviewers. This represents a rather large sample of purchases since around 700-1200 different purchases are made in the cattle market each trading day. In short, data was successfully collected on 10%-15% of all purchases made each trading day.

During data collection, efforts were made to ensure that the sampling was conducted randomly. To this end, teams of data

collectors were allocated different areas of the market. Whenever a purchase was made, the teams tried to interview both the buyers and the sellers. A potential bias can occur when the respondents become familiar with the data collectors, increasing the tendency of respondents to engage in interviews. Since chances of some buyers being overrepresented increases, this can make the sampling non-random.

To prevent the sampling strategy from becoming non-random, several steps were taken. Firstly, the data collection teams were shuffled across different areas in the market at random times so that data collectors interview new respondents. Secondly, it was observed that when participation incentive was offered (i.e. the mobile card), many buyers and sellers expressed interest in being interviewed. The data collectors refused to interview such buyers and sellers. The data collectors only interviewed those buyers and sellers whom the data collectors observed making purchases and approached for interviews themselves.

5.3.3 Potential Measurement Errors

There were several issues created by the research context that had to be accounted for since they can introduce some level of measurement errors.

1. **Limited times:** The first issue is the limited times that buyers and sellers have. The buying/selling in the cattle market is very hectic, as mentioned in the “Empirical Context” section. The buying/selling itself is very cash intensive since no cheques or banking channels are involved. The market is outside the realm of banking channels or governmental financial oversight. The result is that buyers are most difficult to interview. Buyers are always in a rush to spend their cash and make purchases. If buyers come from distant areas, there is an urgency to purchase and return before evening. Sellers, on the other hand, are calmer, although neither sellers nor buyers usually want to spend time on interviews.

To overcome problems posed by limited times, including buyer/seller frustration, several steps were taken. Firstly, interviewers were trained to conduct interviews in short periods. Secondly, buyers and sellers were offered participation incentives. A prepaid mobile card worth 100 Pakistani rupees was offered to both the buyer and the seller as compensation for participation. The incentive worked well and generated interest. Thirdly, the most important, and demanding questions were placed in the beginning. Since it takes buyers and sellers a few minutes to exchange cash, untie the cows/buffalos, and remove the cows/buffalos from their places, questions relating to signaling were asked during this time when buyers and sellers were comparatively relaxed.

Once the cows/buffalos are untied and cash paid, the buyers speed away. The interviewers follow the buyer and ask questions about the buyers' background. During this time, potential data collection errors can occur, for instance, because the buyer doesn't hear the questions, or the buyer is preoccupied inspecting other cows/buffalos. To minimize potential errors in this stage, the questions asked were very basic, lowering the probability of buyers not understanding the questions.

2. **Buyer and seller suspicion of research motives:** The second issue is that many buyers and sellers were suspicious of the research motives. They believed the study was conducted by some tax authority. It is worth noting again that this cash-intensive market is totally outside the oversight of any financial authority. No taxes are levied on trade in the market, presenting the outlook of a typical informal market described earlier (please see Chapter 1 and Chapter 3). When questions regarding incomes or expenses were asked, a large percentage of buyers and sellers refused to answer. Many respondents gave answers that understated incomes. Sellers also understated prices at which they sold their cows/buffalos, while buyers quoted a higher price (questions about purchases were asked from both buyers and sellers). Sellers tried to understate their incomes. As such, income-related data is considered to be untrustworthy in this study.

To overcome bias in questions related to financial backgrounds, answers from other questions were used to control for the financial background of buyers and sellers e.g., number of paid family/non-family members to help in the market, number of other businesses, mode of transport (rent vs owned), number of barns or locations to sell cows/buffalos, etc. Further controls for financial background can be created based on prices of cows/buffalos traded, since buying/selling an expensive cow/buffalo involves high costs for maintaining/feeding/vaccinating.

After having discussed the data collection process, the next section discusses the measurements for all the independent, dependent, moderation, and control variables.

5.4 Variable Measurement Methods

In this section, the measurements for all the independent, dependent, moderation, and control variables are discussed.

During the data collection, questions were asked regarding a wide range of variables. A list of questions about signals and controls that were asked from buyers and sellers can be found in Table 1 (Appendix 1). In general, both the buyers and sellers were asked **common questions** relating to age, education, experience in buying/selling, areas of residence, languages spoken, business backgrounds, number of cattle markets visited, family members/non-family members paid as helpers, seasons of doing business, business practices, financial record keeping, smartphone usage, attitudes, risk-taking behaviour, trust perceptions, cognitive abilities, household conditions, digit span recall, and ethnicities.

Additionally, buyers were asked how they perceived sellers, their relationship with sellers, past purchases made, guarantees offered by sellers, and other questions relating to signals. Sellers were asked about signals they sent along with information on their business literacy, financial skills, stock keeping, and marketing skills. Both the buyers and sellers were asked for details of cows/buffalos purchased, such as price, age, weight, number of previous pregnancies, daily milk

capacity, and breed classification. The objective was to note differences between how buyers and sellers judged the quality of cows/buffalos traded.

Next, the measurements for all the independent, dependent, moderation, and control variables used in the present study are discussed.

5.4.1 Measurement Method: Dependent Variables

The three key outcomes of the study are the dependent variables of interest. Measurement methods for these are discussed next.

PPS. To measure the extent to which buyers are sure that the seller has revealed products' true quality, buyers were asked two 5-point Likert scale questions after the purchase was completed. These 2 questions are reproduced below.

"I'd have to try this seller several times to figure out what the quality of the seller is"

"I never know how good this seller will be before I buy it."

For ease of interpretation, responses from the two Likert scales are averaged to create a numerical scale. Both the questions above are adopted from Swait and Erdem (2007). The questions measure the number of times a buyer will have to buy to learn of the sellers' true unobservable product quality. This is a measure of adverse selection and information costs that a buyer faces during the transaction. These questions were chosen due to their conciseness, given the little time buyers/sellers are willing to provide for responses, as discussed previously. Additionally, due to the low literacy rates of buyers/sellers, interviewers had to ask questions and then physically mark the responses. Adding more questions to measure PPS would be time-consuming, increasing interviewer effort and frustrating the respondents.

PUP. To measure the buyers' perception of price fairness, buyers were asked to provide an answer to the following question after a purchase was made:

For the quality of the animals the seller has, how are the prices?

This measure was designed for the study. Since buyers and sellers have little time to spare for interviews, the question was designed to be very concise and yet easily comprehensible for the buyers.

Price. Price was reported by buyers in Pakistan Rupees (Pkr) after the purchase was completed. Ideally, objective data on price is required. However, data on purchases is not recorded in the cattle markets in Pakistan. Price data is not recorded in any informal market in Pakistan since these markets are outside the oversight of banking and regulatory authorities. Moreover, no banking facilities are involved in informal markets, making access to objective data difficult. The only possible way to gather price data was to ask both buyers and sellers about prices. However, sellers understated the prices, fearing that tax authorities might learn of the prices. So, price information provided by buyers is used in the study.

5.4.2 Measurement Method: Independent Variables (Signals)

After having defined the dependent/outcome variables, the signals/independent variables are defined next. To simplify responses from buyers in the highly stressful and fast-paced cattle market environment, it is the case that dichotomous or multichotomous response questions were mainly used here. This is in line with the study by Drexler, Fischer, and Schoar (2014) which focuses on simplicity in designing research and training content in informal markets, citing the difficulty of respondents to understand complex information.

As mentioned in Chapter 3, and Chapter 4, signals which are enabled by word of mouth will function. Measurement methods for such signals are provided in this section. The scoping-phase study also identified signals that are in use in informal markets, but that are

not enabled by word of mouth but are included in the analysis. Measures for these are also included in this section.

5.4.2.1 Signals that are sustained by word of mouth

The following questions were asked to the buyers after they had purchased from a seller. Each question was asked about the seller from whom the purchase was made. All the measures in this section were designed for the study. Since the aim of the data collection was to explore the use of signals and ask the questions in simple terms, simple questions were designed for each signal.

LPG. Buyers were asked whether sellers offered an LPG or not. The response was coded as a yes or a no. *Product preannouncement.* Buyers were asked whether sellers preannounced information about quality characteristics and price or not. Buyers responded with a yes or a no. *Consistent location.* To learn whether buyers met sellers in the same consistent locations or not, buyers were asked how often they met sellers in the same location in the market. Buyers responded with a never, sometimes, and always. *Credit.* Buyers were asked what percentage of the price the seller allowed to be repaid later. Buyers responded on a scale of 0%-100%.

Visible investments in product care (Fodder fed). In Chapter 3 and Chapter 4, it was discussed that visible investments in product care can take many forms. For low-investment products, product packaging can act as a visible investment in product care, while for high-investment products, fodder fed to cows/buffalos can act as visible investments in product care (see scoping-phase study). Thus, fodder fed is used as a measure for visible investments in product care. To measure the variable, buyers were asked how much fodder the seller was feeding to the cows/buffalos. Buyers responded with no fodder, little fodder, a moderate amount of fodder, or a large amount of fodder.

Wide distribution networks (Calves attached). To determine the impact of a wide distribution network, calves attached is adopted as a measure (please see the scoping-phase study). To measure this

variable, buyers were asked whether sellers had attached calves with cows/buffalos or not. Buyers responded with a yes or a no.

Note: Data on awards from objective sources is not present since no certification bodies are present in the cattle market of study. Thus, the study will not focus on this signal.

5.4.2.2 Signals that are not sustained by word of mouth

As discussed in the scoping-phase study, some signals cannot function using word of mouth as the propagation medium. However, since the scoping study suggested that these signals are still in use in the market, the study is going to explore the impact of these signals on outcomes. *The questions for each signal were asked to the buyers after purchase. Each question is asked concerning the seller from whom the purchase was made.* As mentioned previously, since the aim was to explore signal usage and ask simple questions, simple questions were designed for each signal.

Competitor quality information. To measure competitor quality information, buyers were asked whether the sellers provided information about prices and the quality of other sellers in the market or not. The buyers responded with a yes or a no. *Milking.* Buyers were asked whether the seller allowed milking or not. The buyers responded with a yes or a no. *Auction method to state price.* Buyers were asked whether sellers stated prices upfront when asked or used the auction method to state price. If buyers stated that price was told upfront, this was coded as a no. Otherwise, it was coded as a yes. *Product guarantees.* Buyers were asked whether the seller offered product guarantees or not. Buyers responded with a yes or a no

5.4.3 Measurement Method: Independent Variables (Relationships)

In Chapters 1, 2, and 3, the importance of relationships in informal markets was discussed. To determine the impact of relationships on the three key outcomes and to control for potential omitted variable bias, several variables have been included that cater to buyer-seller relationship strength. Additionally, these questions will

also control buyer learning. These are discussed next. These questions were formulated for the study and used simple terminology.

Buyer seller relationship years. This variable measures the number of years that buyers and sellers know each other. Buyers were asked for how many years they knew the seller? Buyers answered in years, months, or weeks. Answers were converted into a yearly measure. *Ethnicity.* Given the strong ethnic relationships that prevail in informal markets, ethnic relations could reflect both social and business relationships. Buyers and sellers were asked about their ethnic identities. Afterward, it was checked and coded whether both the buyer and the seller belong to the same ethnicity or not.

City. Buyers and sellers were asked about their cities of residence. Same city residences could show strong buyer-seller social bonds, increasing the chances of buyer-seller belonging to same village/locality. Afterward, it was checked and coded whether both the buyer and the seller belong to the same city or not. *Bought from seller before.* Past purchase behaviour can affect the three key outcomes. Buyers were asked whether they had bought from the seller before or not.

5.4.4 Measurement Method: Moderating Variable

The focus of the study is to understand how signal usage differs with seller resource levels. The study mentions that sellers with different resource levels will use different signals (i.e., PR and EB signals) and observe different outcomes due to different seller resource levels. The hypotheses in Chapter 4 clarify these relationships. However, a measure is needed to classify sellers into low-resource and high-resource categories.

To have an accurate measure, various options were investigated, beginning with data on sellers' income. However, as mentioned earlier, sellers were skeptical of the research motives and thought the information could be used by tax authorities. A measure was required that buyers could observe since the objective was to learn expectations that buyers attach with seller resource levels. However, no such measure was found in the existing literature. For

this reason, a new measure was created for the study. It was determined that the number of cows/buffalos that sellers showed to buyers at the time of purchase is a reasonable proxy for sellers' resource levels. There are many factors considered in creating resource level estimates based on cows/buffalos shown to buyers.

- 1) On average, Pakistanis possess 2-3 cows/buffalos per holding, reflecting a very low overall number of cows/buffalos (Bilal et al 2006; Wasim 2007). Other studies put this figure between 2-5 cows/buffalos per household (National Bank of Pakistan 2021) or 1-4 cows/buffalos per household (Umm e Zia e al 2011). However, all cows/buffalos owned do not provide milk in a given time (due to age or health reasons). A figure was needed of milk giving cows/buffalos to form accurate estimates of seller resource levels. To address this shortcoming, guidance was taken from a recent survey which shows that on average Pakistani household owns 1.73 milk giving buffalos (Yasin et al 2019). Based on the estimates of milk giving buffalos an average household owns, a maximum of 2 cows/buffalos per seller reflects low ownership levels.
- 2) Milk giving cows/buffalo are expensive and can be categorized as investment goods. They generate milk, which is sold for revenue. To exercise the revenue potential, cows/buffalos require resources to both purchase and maintain. Caring requires time, effort, and costs - not only fodder costs but also helpers and caretakers. A higher number of cows/buffalos translates into higher costs, which means that sellers have the resources to meet these needs.
- 3) Many sellers purchase cows/buffalos on loans. Sellers can acquire loans when other resources are offered as collateral, reflecting a positive association between owning cows/buffalos and higher resource levels.

To measure the number of cows/buffalos a seller owns, buyers were asked the following after a purchase was made:

“How many cows or buffalos did the seller from whom you purchased show you today”?

The survey data shows that 449 sellers had only one cow/buffalo each to sell, while 231 sellers had two cows/buffalos. This reflects low overall ownership levels for most sellers, which is consistent with estimates of average cow/buffalo ownership in Pakistan (mentioned in point 1 above). Hence, resource levels are divided into two categories:

Low: Sellers who possess a maximum of 2 cows/buffalos (835 sellers)

High: sellers who possess more than 2 cows/buffalos (174 sellers)

5.4.5 Measurement Method: Control Variables

To control for buyer characteristics, two buyer traits are controlled for. Measures for both these variables are derived from De Mel, McKenzie, and Woodruff's (2014) study in Sri Lanka on female micro-entrepreneurs. *Buyer trait risk tendency.* Buyers were asked how much risk they take in general and with their health. Buyers responded on a scale. The risk-taking tendency can impact the key three outcome variables, such as increasing willingness to engage with the seller even if seller credibility is low. *Buyer trait trust tendency.* Buyers were asked how much they trust several entities, like neighbours, police, media, courts, local/national governments, and people they meet for the first time. An aggregate score of buyers' trust tendency is created. Buyer trust tendency can influence the three key outcomes, such as by increasing chances of transactions when sellers are not trustworthy. More trusting buyers can also be easily duped by the pseudo-signals that are identified earlier.

To control for the impact of cow/buffalo quality, two measures are included. Both were adopted for the study due to their relevance to the context and availability of data. This information was collected from buyers after they made a purchase. The answer to these questions is about the seller from which the purchase was made.

Breed. The breed refers to the kind of cow/buffalo. Both buyers and sellers were asked which breed the cow/buffalo belonged to. Interviewers were knowledgeable enough to identify the breeds too. The breeds were divided into two categories: foreign or local. Foreign

breeds include breeds that are imported (mostly from Australia and Hungary) or that have been cross-bred with local breeds. Local breeds include all breeds that are not foreign. Recording breed information is important since foreign breeds are generally more expensive to acquire and maintain and provide higher milk output and better milk quality (such as fattier milk). However, foreign breeds are sensitive to heat, creating maintenance challenges (they require temperature control expenses, like air conditioning or special housing sheds).

On the other hand, local breeds are less expensive in general and are more resistant to heat. They usually have lower milk capacity but are easier to maintain. Local breeds usually provide lesser amounts of milk compared to foreign breeds, but provide milk more consistently (i.e., with lesser intervals).

Cow/buffalo milk (litres). As mentioned previously, sellers can allow cows/buffalos to be milked. Although this was categorized as a pseudo signal, buyers were asked how much milk was extracted when the seller allowed milking or how much milk buyers expected cows/buffalos to provide regularly. The buyers provided estimates of the milk-giving capacity of cows/buffalos. These estimates can be wrong of course, as discussed earlier. The estimates not only reflect the milk-giving capacity of the cow/buffalo, but also encapsulate expectations of health, age, weight, and expected life of the cow/buffalo. By controlling for cow/buffalo milk capacity, a range of cow/buffalo characteristics is being controlled.

Table 5.1 gives a summary of variables used in the study, their interpretations, and response scales.

Table 5.1. *Overview of variables, their interpretations, and response scales*

Note: All questions were answered by buyers after the purchase was made. All the questions are about the seller from which the purchase was made.

Variable	Response scale
Outcomes	
Price	Continuous. Higher values represent higher prices in Pkr (Pakistani Rupees)
Perceived Purchase Safety (PPS)	Continuous. Higher values indicate higher safety perceptions.

Price Unfairness Perceptions (PUP) Continuous.
Higher values indicate higher unfairness perceptions.

Signals

Consistent location Dummy.
(base) 0= Never choose consistent locations 1= Sometimes/always choose consistent locations

Preannouncement Dummy.
(base) 0= No preannouncement made
1= Preannouncement made

Fodder fed Categorical.
(base) 0= No fodder 1= little fodder
2= moderate amount of fodder
3= large amount of fodder

Milking Dummy.
(base) 0= Milking not allowed
1= Milking allowed

Calves attached Dummy
(base) 0= No calves attached
1= Calves attached

Product guarantee Dummy.
(base) 0= No product guarantee offered
1= Product guarantee offered

Auction method Dummy.
(base) 0= Price told upfront
1= Auction method used

Low price guarantee Dummy.
(base) 0= No LPG offered 1= LPG offered

Competitor Qual Info. Dummy
(base) 0= No competitor quality info. provided
1= Competitor quality info. provided

Credit Continuous.
Higher values represent more credit offered.

Moderator

Seller resource levels Dummy.
(base) 0= Low resources 1= High resources

Buyer Traits

Buyer trait risk tendency Continuous.
Higher values represent a higher risk-taking tendency.

Buyer trait trust tendency Continuous.
Higher values represent a lower trust tendency.

Relationship characteristics

Buyer seller relation (years) Continuous.
Higher values represent a longer relationship.

Ethnicity Dummy.

	(base) 0= Buyer-seller different ethnicity 1= Buyer-seller same ethnicity
City	Dummy. (base) 0= Buyer-seller different city 1= Buyer-seller same city
Bought from seller before	Dummy. (base) 0= Not bought from the seller before 1= Bought from the seller before
Cow/buffalo characteristics	
Cow/buffalo breed	Dummy. (base) 0= Local breed 1= Foreign breed
Cow/buffalo milk (litres)	Continuous. Higher values represent more milk.

5.5 Analysis Strategy

After having discussed the empirical context, the scoping-phase study, the empirical data collection process, and the measurement methods, the empirical analysis strategy is discussed next. As part of the analysis, several steps are taken. Firstly, an analysis of market trends and buyer/seller signal behavior is conducted using detailed descriptive and correlational analysis. This analysis makes it easier to understand the market as a whole and connect with the context better. Afterward, T-tests and variance checks are used to determine how signal usage differs across sellers with different resource levels. This analysis provides further insights into signal usage by sellers of different resource levels and reveals insights that can help evaluate results from the empirical model afterward.

After conducting the T-tests, empirical modelling is used to help understand the impact of signals on the three key outcomes. Additionally, the empirical model is vital to understanding the impact of signals on different outcomes, showing the need to combine various signals in an optimal signaling strategy that maximizes(minimizes) the positive(negative) impact of signals on outcomes. During the empirical analysis, the moderating role of seller resource levels and the possible mediating impact of PUP and PPS on price must be considered

(although it is expected that no mediation exists; see Chapter 4). To create a unified model that can model all the moderating and mediating relationships together, the path analysis technique is used. After having created the path model, results are evaluated and the optimal signaling strategy is created. The empirical analysis is carried out in Chapter 6.

In sum, Chapter 5 discussed the empirical context, the scoping-phase study, the empirical data collection process, and the measurement methods. Chapter 5 also discussed, in brief, the analysis strategy that is elaborated in Chapter 6. After the empirical analysis in Chapter 6, important findings are discussed and the optimal signaling strategy is formulated.

Chapter 6: Empirical Modelling

To improve market efficiency, efforts must be made to improve the market process by addressing each of the components in the process. Chapters 1-3 laid the theoretical foundations for the study, showing the need to create optimal signaling strategies that can allow sellers with different resource levels to achieve three key outcomes: increasing PPS, decreasing PUP, and increasing price. To achieve the three key outcomes, signals are needed that can function in informal markets. In Chapter 3, word-of-mouth was identified as the propagation medium that can enable certain signals in informal markets, and three novel signals that can function in informal markets were provided. In Chapter 4, hypotheses were created showing the impact of PR and EB signals on the three key outcomes. Signals that are used in informal markets (as discovered by the scoping study) but which existing theory suggests should *not* function in informal markets were also identified. In Chapter 5, the empirical context and the data generating process were elaborated, showing why the cattle market of the study is chosen and how the variables used in the empirical models are measured.

In this chapter, empirical modelling techniques are adopted. First, model-free analysis using detailed descriptives and correlational analysis shows market trends and buyer/seller signal behavior, making it easier to understand the market and connect with the context better. Afterward, T-tests and variance checks show signal usage differences across sellers with different resource levels. Lastly, the path analysis modelling approach is used to help understand the impact of signals on the three key outcomes, showing differences in signaling outcomes for sellers with different resource levels, and helping create optimal signaling strategies that maximize(minimize) the positive(negative) impact of signals on outcomes.

Next, insights using descriptive data are discussed, showing wide variations in signal usage and interesting buyer/seller behavior in the cattle market.

6.1 Market Trends

In this section, trends that were observed in the cattle market are discussed for both sellers and buyers. During the scoping-phase study, it was discovered that some signals that do not exist in the literature are used in the cattle market, such as milking of cows/buffalos, auction method to state price, and attaching calves with cows/buffalos. These are discussed in detail in Chapter 5. Descriptive data for these variables has been gathered and is discussed in this chapter along with the descriptives for all other variables.

Table 6.1 shows descriptive statistics for buyers and sellers, along with seller usage of signals and buyer interaction with signals.

Table 6.1 Buyer/seller descriptive statistics	
Sample size: 1073 buyers/sellers	
Note: Seller trends are based on seller responses, while buyer trends are based on buyer responses.	
Seller Trends	
<u>General descriptive statistics</u>	
Seller arrival time in the market	8 a.m.
Buyer arrival time in the market	7.30 a.m.
Sellers who think they have zero competitors	96.52%
Sellers who think they sell cows/buffalos of good/very good quality	86.93%
Sellers who choose consistent locations	55.73%
Sellers who visited the market each week in the last 4 weeks	75%
Sellers who came to market each week in the last 4 weeks and chose consistent locations each time	65%
<u>Seller use of signals</u>	
Sellers that allow milking once	66%
Sellers who chose the same consistent location in the market last 4 weeks and who allow milking once	57%
Sellers that provide competitor quality information	44.45%
Sellers who chose the same consistent location in the market last 4 weeks and that provide competitor quality information	53%
Sellers who use preannouncement signal	39%
Sellers who chose the same consistent location in the market last 4 weeks and who use preannouncement signal	39%
Sellers who offer product guarantees/LPGs	12.12%
Sellers who chose the same consistent location in the market last 4 weeks and who offer product guarantees/LPGs	32%
<u>Seller demographics</u>	
Sellers who are traders	60%
Sellers who chose the same consistent location in the market last 4 weeks and who are traders	71%
Seller selling experience (years)	8.4 (SD 7.6)
Seller age (years)	37.9 (SD 10.4)
Sellers who are married	88.54%
Sellers who use smartphones	25.07%
Sellers who chose the same consistent location in the market last 4 weeks and who use smartphones	33%

Sellers with no education	35.45%
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Buyer Trends

General descriptive statistics

Buyers that do not visit any second seller before making a purchase	26.04%
Buyers who strongly agree or agree that they must buy many times to learn sellers' true quality	59.55%
Buyers who strongly agree or agree that they cannot know the quality of the sellers' animals until they buy from him	47.81%
Buyers who think that sellers are charging prices higher than quality levels	32.09%

Buyer interaction with signals

The buyer was told the price using auction method	10.76%
Buyer-seller relationship duration (years)	3.9 (SD 6.5)
Buyer bought from the seller before	48.28%
The buyer knows zero people that bought from the seller before	52.66%
The seller was recommended to the buyer by zero people	54.05%
Buyers who visited marked each week in the last 4 weeks	74.18%
Buyers who never meet sellers in the same consistent location	35.17%
Buyers who were provided competitor price information by sellers	38.34%
Buyers who received preannouncements from sellers	29.77%
Buyers who received product guarantees from sellers	24.91%
Buyers who received LPGs from sellers	15.66%
Buyers who were allowed milking once by sellers	53.87%
Buyers who were offered a percentage of credit by sellers	13.42%
Buyers that observed sellers with calves attached	36.16%
Buyers that observed sellers feeding less fodder	34.20%
Buyers that observed sellers feeding large amounts of fodder	31.03%

Buyer demographics

Buyers who are traders	60.39%
Buyer's buying experience (years)	7.5 (SD 7.1)
Buyer age (years)	38.4 (SD 11.1)
Buyers who are married	87.60%
Buyers who use smartphones	29.45%
Buyers with no education	24.42%

6.1.1 Descriptives For Sellers

On average, sellers come to the market close to 8 a.m., with the last sellers coming around 11.45 a.m. On average, the buyers also come around 7.30 a.m. to 7.40 a.m., showing that both buyers and sellers come to the market at similar times. Overall, around 96% of the sellers are not aware of how many other sellers – potential competitors - sell the same cow/buffalo type as they do. Around 40% of the sellers think that they sell cows/buffalos of very good quality, 45% consider their quality to be good, and only 13% consider their quality to be average. Around 55% of the sellers attempt to place their

cows/buffalos in the same location or shed whenever they came to the market. This shows that the sellers believe that they are selling products of good quality, with half the sellers attempting to place their cows/buffalos in the same consistent locations every time they visit the market.

Around 75% of sellers come each week to the market, while 11% come three weeks in a month, and 7% come only two weeks in a month. This shows that most sellers try to come to the market each week. Interestingly, of the sellers who try to choose the same location every time they come to the market, around 65% can successfully place their cows/buffalos in the same shed/locations every time. This shows that sellers generally try to choose consistent locations, lending support to the novel signal discussed in Chapter 3.

In general, sellers did not pay any money to the management for placing cows/buffalos in sellers' locations of choice. Perhaps they do not pay or are simply not willing to reveal the payments they make, since they seem to be suspicious of the data collection motives. Around 66% of sellers allow buyers to once milk cows/buffalos to check the quality, while 5% don't allow milking at all. Compared with sellers who are not able to choose the same locations for cows/buffalos each week, sellers who can choose the same locations each week allow cows/buffalos to be milked fewer times. For instance, of the sellers who choose the same location each week, 57% allow the cows/buffalos to be milked once and 22% allow milking twice, whereas for sellers who are not able to get the same location even once, around 67% allow milking once and 14% allow milking twice. The difference, however, is not very pronounced between the two groups. In sum, almost half the sellers allow milking to let buyers learn of quality.

Sellers also display a lot of variation in providing information about competitors. Around 45% of the sellers tell buyers about the prices and quality of other sellers. However, a higher percentage (53%) of sellers who choose the same location each week provides information on prices or quality of competitors, showing that sellers who choose consistent locations are more likely to provide competitor quality information. At the same time, around 61% of sellers -

regardless of choosing a consistent location - don't preannounce before bringing cows/buffalos to the market. Overall, less than half of sellers either use preannouncements or competitor quality information as signals.

Only 12% of the sellers offer any product guarantees/LPGs, although a higher proportion of sellers (32%) who choose consistent locations offer product guarantees/LPGs. While sellers who choose consistent locations are more likely to offer product guarantees/LPGs, the use of product guarantees or low-price guarantees is very limited. No seller has any certifications from a certifying body, such as a breeder association or any other cow/buffalo training organization.

Of all the sellers, 60% are cow/buffalo traders, 23% are both traders/farmers (worked on farms/owned farms), 14% are farmers (do not usually trade in cows/buffalos) and 4% are intermediaries (connect buyers/sellers and charge a commission on the purchase or buy cows/buffalos to re-sell for profit). Among sellers who choose consistent locations every time they visit the market, around 71% are traders who do not own farmlands or engage in farming, showing that traders mostly sell in the market. Sellers have a mean selling experience of 8.5 years, with a maximum experience of 50 years. The sellers have a mean age of 37 years. Around 89% of sellers are married, and 25% of the sellers can use smartphones, although smartphone usage increases (33%) for sellers that choose consistent locations. Overall, very few sellers can use complex information technology interfaces, lending support to the argument that information technology-based signals are unlikely to work.

Additionally, 35% of the sellers lack any sort of education, 10% have attained primary education (until grade 4), 25% have attained secondary education (until grade 8), and 19% have attained intermediate education (grade 10). Given the low education levels, using information technology-based signals becomes even more difficult. Most of the sellers come from near the localities of the cattle market: 58% come from Sheikhpura (location of cattle market), 6.85% come from Farooqabad (located close to Sheikhpura) and 5% come from Lahore (provincial capital located 45 minutes away from

Sheikhupura). Most sellers who get consistent locations are from Sheikhupura and Farooqabad. The trend shows that the cattle market attracts the highest proportions of sellers from nearby rural areas and towns, where issues of resource inequality and power differentials are pronounced.

In sum, the descriptives show that guarantees are used rarely while consistent locations are used by half the seller population, with other signals showing wide variations in use. Moreover, lack of education and smartphone usage makes signals that rely on information technology infeasible. Next, the buyer trends are discussed.

6.1.2 Descriptives For Buyers

Around 26% of the buyers do not visit any second seller before making a purchase, while around 75% meet multiple sellers before making a purchase (Table 6.1). Overall, buyers meet multiple sellers before purchasing.

On the statement “I have to buy many times from this seller to learn of his quality”, around 21% of the buyers strongly agreed (i.e., must buy many times to learn of the seller’s quality), 39% agreed, and 32% neither agreed nor disagreed. In answering another similar question – “I cannot know the quality of the animals’ sellers until I buy from him”- around 14% of the buyers strongly agreed (i.e., must buy many times to learn of true quality, around 33% agreed, and 29% neither agreed nor disagreed. Buyer responses to both statements reflect high adverse selection for half the buyers, requiring buyers to buy many times from the seller to learn true product quality. Additionally, given the quality of cows/buffalos, 32% of the buyers thought that purchase prices were higher (i.e., buyers had high price unfairness perceptions), while 59% thought the prices were commensurate with quality.

In sum, buyers must buy many times to learn of sellers’ true product quality, reflecting very high degrees of adverse selection, while one-third of the buyers believed that prices were higher than

those offered in the market. Next, buyer interaction with signals is discussed.

6.1.3 Buyer Interaction With Signals

90% of the buyers claim that sellers tell them the price directly, while 10% of the buyers claim that sellers first ask other buyers what they are willing to pay and then tell a price to the focal buyer (i.e., auction method to state price). This shows that the auction method to state price, a signal that was revealed during data collection in the cattle market, is used by few sellers (Table 6.1).

On average, buyers know sellers for 3.9 years. 48% of the buyers have bought from the seller before, 48% of the buyers know someone that has bought from the seller before, and 46% of the buyers buy from sellers that are recommended. This shows that buyers roughly prefer to buy from old sellers, possibly to avoid seller fraud, as was discovered in the scoping-phase study. The results suggest that around half the purchases involve sellers who are not recommended or are unknown.

74% of the buyers came to the market each week in the last 4 weeks, while 4.5% came once. This proportion is like that of the sellers, showing that roughly 75% of the buyers and 75% of the sellers visit the market each week. Meanwhile, 14% of the buyers always meet sellers in the same/consistent locations, 50% of the buyers sometimes meet sellers in the same/consistent locations, and 35% of the buyers never meet sellers in the same/consistent locations. The low number of buyers who always meet sellers in the same/consistent locations shows less importance of consistent locations for buyers. This contrasts with sellers of whom 55% attempt to choose the same/consistent locations every time they visit the market, as discussed previously.

61% of the buyers claim that sellers provide no information about the prices of competitors. This is consistent with the proportion of sellers (55%) who do not provide competitor quality information, as discussed previously. Moreover, 70% of the buyers claim that the sellers do not provide preannouncement information. This proportion

is roughly like the one for sellers that was discussed previously, where around 61% of the sellers don't preannounce.

75% of the buyers are not given any product guarantees, while 84% are not given any low-price guarantees. This is quite like the proportion of sellers (90%) who claim not to provide guarantees/LPGs, as discussed previously. An interesting point to note is that while 90% of the sellers claim not to provide product guarantees/LPGs, 75% of the buyers claim not to receive these. The gap between sending the signal and receiving the signal indicates that perhaps buyers perceive guarantees as implicit. It was discussed in Chapter 2 that when a seller is perceived to have a high reputation, buyers can perceive implicit guarantees (i.e., the seller does not have to explicitly offer guarantees). Given the huge importance of reputation in the cattle market, guarantees can be perceived as implicit.

Around 15% of the buyers are not allowed to milk cows/buffalos even once to check the quality, while 53% are allowed milking once. This contrasts with the proportion of sellers that allow milking once (66%), or not at all (5%), as discussed previously. This suggests that sellers do not want buyers to learn of quality. Around 40% of the buyers claim that the seller is feeding less fodder or no fodder to cows/buffalos, while 60% claim that sellers are feeding medium or large amounts of fodder, showing that most sellers feed fodder, creating opportunities to use fodder fed as a signal, consistent with the new signaling framework in Chapter 3. Additionally, 87% of the buyers are not offered any credit, showing that this signal is used sparingly, perhaps due to the weak financial conditions of sellers themselves (due to low incomes and prevalence of credit). Similarly, calves attached are also used sparingly as a signal, with only 36% of the buyers reporting calves attached.

20% of the buyers are farmers who own lands but usually do not trade (cows/buffalos are bought mostly for farm work and milk consumption without the aim of further trade), and 60% are traders (who buy and sell cows/buffalos as a business). Like buyers, 60% of the sellers are also traders, although a higher proportion of sellers (23%) are both traders and farmers compared to buyers (10%), while

a higher proportion of buyers are farmers (20%) and intermediaries (8%) compared to sellers (14% and 4%, respectively). The higher proportion of farmers in buyer groups (20%) compared to seller groups (14%) reflects the end-use of buying cows/buffalos for farm use, where milk and dung have many uses, as discussed at the beginning of the chapter.

On average, buyers are buying for 7.5 years in the market, with a maximum of 50 years. The mean experience of buyers is slightly less than that of the sellers (8.5 years). Like sellers, almost 87% of the buyers are married. The average age of buyers is around 38 years – almost equal to that of sellers, with the highest age of 83 years. The average education of buyers is around 6 years. 24% of the buyers have no education, 9% have attained primary education (until grade 4), 26% have attained secondary education (until grade 8), and around 22% have attained intermediate (until grade 10) education. The proportion of sellers that have no education is higher (35%) compared to buyers, while proportions for primary, secondary, and intermediate education are roughly similar. The higher proportion of sellers without education and higher mean selling experience suggests that sellers join the cattle market early and devote themselves exclusively to selling. A similar trend was discovered during the scoping-phase study.

Like sellers, only 30% of the buyers have smartphones. Very few buyers and sellers can use complex information technology interfaces, lending support to the argument that information technology-based signals are unlikely to work in informal markets. Given the low education levels for both buyers and sellers, using information technology-based signals becomes even more difficult, even if some training is provided.

47% of the buyers come from Sheikhpura (the location of the market), 6% come from Farooqabad (located close to Sheikhpura) and 6.5% come from Lahore (the provincial capital located 45 minutes away). Compared to sellers (55%), the proportion of buyers (47%) from Sheikhpura is lesser, showing that buyers come from more distant areas to the market. The proportion of sellers

coming from Lahore and Farooqabad is roughly the same as that of buyers. In the scoping-phase study, it was observed that buyers come from far-flung areas, such as from the extreme south (e.g., Karachi, Rajasthan) and extreme northwest (e.g., Waziristan). For reference, the cattle market is in the extreme northeast. Overall, nearly 50% of the buyers come from areas very close to the cattle market (i.e., Sheikhpura), while 15% to 20% come from distant cities.

The descriptives reveal interesting trends in signal usage and demographics from both buyer and seller sides. Next, results from correlation analysis are discussed.

6.1.4 Correlations

The correlations reveal many interesting aspects of informal markets (Table 6.2). Firstly, the correlation between having bought from a seller before and the number of people buyers know that bought from the seller is moderately high (0.42). Similarly, buying from a seller who was recommended is moderately high (0.43). Buying from a seller and meeting the seller at the same consistent location is moderately highly correlated (0.47). In sum, the correlations show the importance of relationships in the cattle market.

Table 6.2 *Correlations*

Note: Correlations are based on buyer responses

	Correlation matrix						
	Times buyer bought from seller	People buyer knows who bought from seller	Number who recommended seller to buyer	Times buyer/seller met in the same location	Preannouncement days	Times milking allowed	Credit %
Times buyer bought from seller	1.00						
People buyer knows who bought from seller	.42***	1.00					
Number who recommended seller to buyer	.44***	.45***	.00				
Times buyer/seller met in same location	.47***	.34***	.35***	1.00			
Preannouncement days	.17***	.12***	.23***	.09***	1.00		
Times milking allowed	-.01	.13***	.06**	.02	.11***	1.00	
Credit %	.09***	.02	.08***	.12***	.06**	-.03	1.00
Seller selling experience (years)	-.05	-.18***	-.05	-.14***	.06	-.08***	-.03

Seller education (years)	.11***	.01	.09***	.08***	.07***	-.03	.14***
Cow/buffalo age	.01	.12***	-.00	.02	.01	.07***	.07***
Cow/buffalo weight	.13***	.21***	.19***	.24***	.02	.09***	.19***
Cow/buffalo milk capacity	.04	.12***	.06**	.02	.03	.00	.05
Cow/buffalo previous pregnancies	-.07	-.00	-.07***	-.03	-.07**	.12***	.09***
Price	.05	.09***	.04	.07***	-.00	.08***	.11***
Buyer buying experience (years)	-.05	-.07***	-.08***	-.01	.04	.12***	-.06**
Buyer age (years)	-.03	.03	-.01	.02	.00	-.10***	-.01
Buyer education (years)	.12***	.23***	0.16***	.15***	.04	.16***	.07**

***Significant at the 1 percent level

**Significant at the 5 percent level

Table 6.2 *Correlations* (continued)

	Seller selling experience (years)	Seller education (years)	Cow/ buffalo age	Cow/ buffalo weight	Cow/ buffalo milk capacity	Cow/ buffalo previous pregnancies	Price
Seller selling experience (years)	1.00						
Seller education (years)	-.07	1.00					
Cow/buffalo age	-.08***	.07**	1.00				
Cow/buffalo weight	-.06***	.07**	.29***	1.00			
Cow/buffalo milk capacity	.15***	.12***	.09***	.22***	1.00		
Cow/buffalo previous pregnancies	-.08***	.09***	.52***	.26***	.13***	1.00	
Price	.09	.06	.16***	.35***	.48***	.13***	1.00
Buyer buying experience (years)	.23***	-.03	-.03	.05	.05	.05	.09***
Buyer age (years)	-.00	-.16***	-.01	.01	-.06	-.01	-.00
Buyer education (years)	.05	.17***	.13***	.16***	.19***	.14***	.14***

***Significant at the 1 percent level

**Significant at the 5 percent level

Table 6.2 *Correlations* (continued)

	Buyer buying experience (years)	Buyer age (years)	Buyer education (years)
Buyer buying experience (years)	1.00		
Buyer age (years)	.18***	1.00	
Buyer education (years)	-.09***	-.23***	1.00

***Significant at the 1 percent level

**Significant at the 5 percent level

On the other hand, the number of times a buyer bought from the seller before has a correlation of 0.17 with preannouncements, -.005 with milking, and .09 with credit offered. The number of people who recommended sellers has a small correlation with

preannouncement days (0.22). Overall, correlations show that neither recommendations nor buying decisions are based solely on signals.

Price seems to have medium to high correlations with cow/buffalo characteristics, such as weight (0.35), milk capacity (0.47), age (0.16), and previous pregnancies (0.12). Of all the cow/buffalo characteristics, milk capacity seems to be most highly correlated with price, which is understandable since cows/buffalos are traded mainly for milk production. Previous pregnancies of cow/buffalos have a high correlation (0.52) with age, which shows that as age increases, the number of cow/buffalo pregnancies increases too.

For both buyers (-0.23) and sellers (-0.07), an increase in years of buying in the cattle market shows a decrease in years of education – reflecting that people trade-off education for buying/selling or simply that lesser educated people mostly trade in the market, making use of complex information technology-based signals infeasible. Results also show an interesting point: buyers who are more aged can fetch a lower price for cows/buffalos they buy (-.0027), reflecting gains from greater negotiation skills. As sellers become educated, they have a higher tendency to offer credit (0.13), perhaps because they learn better to differentiate themselves from the competition.

Next, cross-tabulations and variance analysis show variations in signal usage by sellers with different resource levels.

6.2 Signal Usage Based On Seller Resource Levels

Results using cross-tabulations and ANOVA analyses show that signal usage varies widely with seller resource levels. Table 6.3 shows that most sellers, regardless of resource levels, state the price directly to buyers without using the auction method. The Chi-square test for difference across categories is rejected, showing no difference in signal usage across different seller resource levels. Across both seller resource level categories, around 7%-10% of sellers use the auction method to state price, showing that this signal is used by few sellers. However, notable differences are observed in the usage of other signals.

Table 6.3 *Signal usage by sellers with different resource levels*

Note: All responses are provided by buyers.

	High- resource seller	Low- resource seller	T-statistic/ F-statistic
Signal Usage (signals received by buyers)			
Auction method usage	6.94%	10.34%	1.37
Consistent locations chosen	85%	42%	-10.7***
Competitor quality information provided	48.28%	37.29%	-2.7***
Preannouncement information provided	47.70%	25.75%	-5.8***
Product guarantees provided	35.06%	23.98%	-3.04***
LPG provided	12.64%	16.77%	1.34
Milking allowed	71.84%	87.09%	5.49***
Calves attached	39.66%	37.84%	-0.44
Selling price (Pkr)	150729.8	136540.1	16.06***
"The seller offers prices higher than quality"	20.11%	33.93%	3.1***
Cow/buffalo characteristics			
Milk capacity of cow/buffalo sold (litres)	12	10.7	18.92***
Local cow/buffalo breed sold	73.8%	75.3%	-0.42
Relationship characteristics			
Buyer bought from seller before	74.1%	43.3%	-7.59***
buyer-seller relationship years	4.9	3.4	9.02***
Buyer-seller sharing city	62.6%	37.3%	-0.7
Buyer-seller sharing ethnicity	14.4%	12.5%	-0.66

***Significant at the 1 percent level

**Significant at the 5 percent level

In choosing consistent locations as selling points, stark differences are observed across sellers based on resource levels. 85% of the high-resource sellers use consistent selling locations, compared to 42% of the low-resource sellers. The mean of differences is also statistically significant. This result is opposite to expectations since it was thought that low-resource sellers choose consistent locations to allow the spread of negative WOM (see Chapter 3). Differences in using competitor information as a signal are observed too: 37% of low-resource sellers use the signal compared to 48% of high-resource sellers. However, the difference of means is significant.

Surprisingly, fewer low-resource seller use a preannouncement signal, whereas 47% of high-resource sellers preannounce. The difference of means is significant. In terms of offering product guarantees, 35% of high-resource sellers use the signal compared to 24% of low-resource sellers. The difference of

means is significant, showing that high-resource sellers use this signal more often.

Unlike product guarantees, no difference of means is observed for LPGs. Around 16% of low-resource sellers and 12% of high-resource sellers offer LPGs. The likelihood of offering LPGs is considerably lower compared to the likelihood of offering product guarantees for both seller types. This shows that LPGs are rarer in the market. When it comes to allowing buyers to milk cows/buffalos, 87% of low-resource sellers and 71% of high-resource sellers use this signal. The difference of means is significant. Given the widespread abuse of milking in the market and the high use of this signal by low-resource sellers, the possibility rises that low-resource sellers are associated with fraudulent practices, as discussed at the beginning of this chapter.

Data shows interesting trends in using fodder as a signal. The difference of means is significant: 37% of low-resource sellers feed less fodder compared to 26% of high-resource sellers. Similarly, 31% of low-resource sellers feed large amounts of fodder compared to 20% of high-resource sellers. However, 51% of high-resource sellers feed medium amounts of fodder compared to 25% of low-resource sellers. This shows that high-resource sellers avoid feeding very large amounts of fodder or very low amounts, potentially because feeding large amounts of fodder can be attributed to deceptive behaviour, while feeding very low amounts of fodder can be attributed to sick and unhealthy cows/buffalos, as discussed at the beginning of this chapter.

In using credit, a significant difference in means is observed. 87% of low-resource sellers do not offer credit compared to 79% of high-resource sellers. While this might seem trivial, differences are present: 3% of low-resource sellers offer between 40%-100% of the price as credit, compared to 8% of high-resource sellers, showing that high-resource sellers are twice likely to offer credit compared to low-resource sellers. In attaching calves, no difference of means is observed between sellers with different resource levels. Around 60% of both low-resource and high-resource sellers do not attach calves.

In terms of cow/buffalo characteristics, no differences in breed types are observed. 75% of both low-resource and high-resource sellers sell local cow/buffalo breeds, showing no mean difference. The prevalence of local breeds shows the difficulty in acquiring and maintaining foreign breeds, given meagre incomes. Buyer estimates of milk giving capacity are higher for cows/buffalos sold by high-resource sellers (12 litres) compared to those sold by low-resource sellers (10 litres), showing that high-resource sellers are perceived to be more caring and to be offering cows/buffalos of higher quality.

Interesting trends emerge between seller resource levels and relationship characteristics. There is a significant difference of means in seller resource levels and having bought from a seller before. Of all purchases with low-resource sellers, 43% involve having bought from low-resource sellers before, compared to 74% for high-resource sellers. Furthermore, there is a slight but non-significant difference in means of buyer-seller relationships for the two seller groups. The mean years of relationship between low-resource sellers and buyers are 3.4 years, compared to 5 years for high-resource sellers. The difference might be because high-resource sellers are selling in the cattle market for longer. On the other hand, low-resource sellers can be moving across markets or doing unrelated jobs (e.g., working on farms, etc.). Low-resource sellers have a disadvantage in that they must earn and save money before they can buy in the cattle market, reducing average relationship durations with buyers.

In terms of origin, 60% of buyers and sellers (regardless of resource levels) do not come from the same city, while around 85% of buyers and sellers do not share an ethnicity. High-resource sellers get higher prices compared to low-resource sellers. While low-resource sellers get a mean price of 136,000 Pkr, high-resource sellers get a mean price of 150,000 Pkr: 9.3% higher compared to low-resource sellers. The higher mean price that high-resource sellers gain can be attributed to expectations of higher milk yields of cows/buffalos sold by high-resource sellers, which reflect greater expected quality.

In sum, analysis of variance, tabulations, and t-tests show that very few sellers use the auction method to state price as a signal,

regardless of resource levels, while there are marked differences in usage of other signals. For instance, 85% of high-resource sellers choose consistent locations (vs 42% low-resource sellers), 48% of high-resource sellers provide competitor quality information (compared to 30% of low-resource sellers), 47% of high-resource sellers preannounce (compared to 26% of low-resource sellers), 35% of high-resource sellers offer product guarantees (compared to 24% of low-resource sellers), 12% of high-resource sellers offer LPGs (compared to 16% of low-resource sellers), and 71% of high-resource sellers allow milking (compared to 87% of low-resource sellers). In terms of attaching calves, 40% of both seller types use this signal. In offering credit, the proportion of high-resource sellers offering credit between 40%-100% of the price is twice compared to the proportion of low-resource sellers. LPGs and auction method to state price are rarely used, regardless of seller resource levels.

Interestingly, while a higher proportion of low-resource sellers feed less fodder (37%) or large amounts of fodder (31%) compared to high-resource sellers (26% and 20%, respectively), high-resource sellers are twice likely to feed medium amounts of fodder (51%) compared to low-resource sellers (25%). Signal usage behavior shows that high-resource sellers are more likely to use certain signals, such as consistent locations, competitor quality information, preannouncement, product guarantees, percentage of credit, and moderate fodder amount. On the other hand, low-resource sellers are more likely to use certain signals, like milking and feeding either large or small amounts of fodder. Signals used by low-resource sellers are likely to be attributed to fraudulent practices (please see the start of the chapter).

Having seen key differences in usage across signals by sellers with different resource levels, the empirical model is created next, and the hypotheses are tested.

6.3 Empirical Modelling

After having discussed market trends and signal usage by sellers with different resource levels, the empirical model is created. In the empirical model, variables that were identified in Table 5.1 are used. These variables are reproduced in Table 6.4 along with brief descriptive statistics. While signaling behavior, relationships, and cow/buffalo characteristics have been discussed in the previous section, useful information about outcomes and moderators is observed.

On average, buyers are not confident in buying from sellers. Higher values show higher levels of Perceived Purchase Safety. Around 63% of buyers must buy many times to learn of the seller's true quality, while around 23% of buyers are not sure what to answer and only 13% of buyers said that they will not have to buy to learn of quality (see Table 6.1). Furthermore, only 8% of buyers said that sellers' price was less given the quality of cow/buffalo. Around 58% said that seller prices are commensurate with the quality, while 32% said that seller prices are higher compared to quality (Table 6.1). In sum, a third of buyers think that sellers are charging prices greater than product quality.

The average price of a cow/buffalo sold is 139,000 Pkr, with a minimum price of 39,500 Pkr and a maximum price of 300,000 Pkr. The bulk of the prices is between 80,000 Pkr and 180,000 Pkr, showing wide dispersion. Prices reflect high-investment products. With an average Pakistani annual income of 1,280 USD (207,800 Pkr/year or 17,317 Pkr/month), prices in the market are above and beyond the purchasing power of most Pakistanis (Worlddata.info, 2021), reflecting high purchase risks.

Table 6.4 *Variables used in the study: descriptive statistics.*

Note: Analysis is based on buyer responses

Category	Min.	Max.	Mean	%
Outcomes				
Price (Pkr)	39,500	300,000	139,290	
Perceived Purchase Safety (PPS)	1.0	5.0	3.5	
Price Unfairness Perceptions (PUP)	0.0	3.0	2.2	

Signals			
Consistent location: Sellers choose consistent locations			49.9%
Preannouncement: Sellers preannounce cow/buffalo information			29.7%
Fodder fed: Sellers feed at least some amount of fodder			95.2%
Milking: Sellers allow milking			85.2%
Calves: Sellers attach calves			36.1%
Product guarantees: Sellers offer guarantees			24.9%
Auction method: Sellers use auction method			10.7%
Low price guarantee: Sellers offer guarantees			15.6%
Competitor Qual Info.: Sellers provide competitor quality info.			39.1%
Credit: Sellers offer at least some credit			13.4%
Moderator			
Seller resource levels: Sellers with low resource levels			82.7%
Buyer Traits			
Buyer trait risk tendency	0	10	2.9
Buyer trait trust tendency	1	4	1.8
Relationship characteristics			
Buyer seller relation (years)	.002	70	3.9
Ethnicity: Buyer-seller same ethnicity			12.8%
City: Buyer-seller same city			37.3%
Bought from the seller before: Buyer bought at least once before from seller			48.2%
Cow/buffalo characteristics			
Cow/buffalo breed: Local breed			75.2%
Cow/buffalo milk (litres)	0	45	10.9

To test the hypotheses from Chapter 4, the path analysis technique is used. This technique relates independent variables to dependent variables, estimating the relationships in a system of structural equations. The key strength of this modelling technique is

that it allows accommodating multiple dependent variables and modeling their relationships with multiple independent variables. Regardless of the length of path diagrams or the number of relationships included, the technique analyses relationship strengths using a correlation or covariance matrix as input. Path analysis decomposes simple (bivariate) correlation between any two variables into the sum of the compound paths connecting these points, allowing estimates from the path analysis to be interpreted like regression coefficients (Hair, 2009).

The path analysis method is suited for the study for many reasons. Firstly, it allows testing multiple outcomes (PPS, PUP, price) that can be influenced by a range of predictors (signals, buyer characteristics, cow/buffalo characteristics, relationship characteristics) and include both mediator and moderation relationships. Given the complexity of the theoretical relationships being tested, not only does path analysis allow modelling these complex relationships, but also allows evaluating the model as a whole. An alternative option is to run multiple regression models separately for each dependent variable. However, the results would be fragmented, and model comparisons would be complicated.

Secondly, in addition to helping simplify complex theory into a simple, interpretable single model, path analysis allows comparing model fit statistics across multiple iterations of the same model, allowing us to use a hierarchical model approach. In the study, a hierarchical model approach is adopted. This approach has been chosen for many reasons. Firstly, a hierarchical model approach allows to build from the base model and observe how model results change by adding variables into the base model. Secondly, a hierarchical model allows accurate comparisons of model fit. If different models are created, model fit comparisons lose value, and selecting a final model becomes difficult. To assess the model fit, four model fit statistics will be used: R squared, the likelihood ratio, AIC, and BIC (Maydeu-Olivares and Garcia-Forero 2010). These goodness-of-fit measures are provided by many statistical packages. In the study, STATA-SE 17 is used.

After running the path analysis model, STATA provides overall goodness-of-fit statistics (including the AIC, BIC) and overall equation level goodness-of-fit statistics for the multiple dependent relationships (providing measures of R squared). A lower value of both the AIC and BIC indicates better model fit. These two measures are used to compare models (Maydeu-Olivares and Garcia-Forero 2010). The R squared allows comparing the variation explained by the individual dependent relationships and the overall model. The higher the variation explained, the better the model is from that perspective. In addition, the likelihood ratios of different models are also compared. The likelihood ratio compares the saturated model (which fits the covariance perfectly) and assesses how well the predicted model fits compared to the saturated model. If the null is rejected, it means that the predicted model does not fit as well compared to the saturated model. In sum, along with the likelihood ratios, three other model fit statistics are used to compare model results: R squared, AIC and BIC.

Next, the hierarchical model approach is adopted using the path analysis technique to create an empirical model.

6.3.1 Hierarchical Model-Approach

The study uses the path analysis technique to test hypotheses using the hierarchical model approach. In this approach, the variables identified and produced in Table 6.4 are used. All variables present in Table 6.4 are used in the study. The only exception is that instead of price, the log of price is used. This is to ensure a greater level of normality in the analysis and avoid issues that might be created due to high variance within the price variable (Stock and Watson 2012). Table 6.33 shows that taking the log of price results in a lower kurtosis and skewness compared with kurtosis and skewness of price (3.31 & -.55 vs 3.5 & .43, respectively). The variance and standard deviation are also reduced considerably, improving normality.

	Observation	Mean	Std. dev.	Skewness	Kurtosis
Price	1,072	139290.1	43216.9	.43	3.54
Logprice	1,072	11.7	.33	-.55	3.31

In the study, Logprice is an outcome variable. However, Logprice might influence both PPS and PUP (i.e., acts as a predictor variable). To check the impact of Logprice on PUP and PPS, Logprice is regressed on both PUP and PPS. Table 6.6 shows the regression results, indicating that Logprice does not influence PUP or PPS. Additionally, the model is also rejected. Hence, Logprice will not be used as a predictor variable. This seems to suggest that both PPS and PUP are not influenced by prices. Rather, they reflect the tendency of sellers to cheat buyers. The results also show that the model is unlikely to suffer from reverse causality since Logprice does not influence PPS or PUP. PPS and PUP may influence Logprice. Impact of PPS and PUP on Logprice is tested in the next model.

Table 6.6 <i>Regressing Logprice on PPS and PUP</i>		
Note: Analysis is based on buyer responses		
Signals	PPS	PUP
<i>(Base category: signals sent by low-resource sellers)</i>		
Logprice	.08 (.06)	.07 (.06)
Product guarantee	.05 (.05)	-.18*** (.04)
Preannouncement	-.19 (.12)	
Low price guarantee	.45*** (.16)	-.17 (.14)
Credit	.0000668 (.00005)	.00008*** (.00004)
Consistent location	-.09 (.12)	-.35*** (.08)
Fodder fed	.12 (.06)	
Milking	-.27** (.13)	.13 (.08)
Calves	.43*** (.10)	.07 (.09)
Auction method	-.18*** (.07)	
Competitor Qual Info	-.24*** (.04)	
cons	2.5*** (.8)	1.41*** (.71)
<i>Prob > chi2</i>	0.0306	

***Significant at the 1 percent level
**Significant at the 5 percent level

Table 6.7 shows the results of the path analysis using the hierarchical model approach, while Table 6.8 shows the model fit statistics. In creating the final model, three different models using the path analysis approach are created. In Model 1, signals, buyer traits, relationship characteristics, and cow/buffalo characteristics were regressed on the three outcome variables, as hypothesized. However, no mediation relationships are included. No signal interactions are included either. However, as shown in Table 6.8, the null hypothesis is rejected, meaning that the predicted model does not fit as well compared to the saturated model. The Adjusted R^2 of 51% shows that over 51% of the variation is explained successfully. In Model 2, the mediation is added, with PPS and PUP regressed on Logprice. Table 6.8 shows that Model 2 explains around 51% of the variation. This is quite close to the variation explained by Model 1. However, Model 2 is not rejected. The null is not rejected, meaning that the predicted model fits well compared to the saturated model.

While Model 2 is not rejected and shows a slightly higher Adjusted R^2 , Model 2 does not allow testing the impact of PR/EB signals on outcomes. In Model 3, two changes are made. Firstly, the signal interactions are added, and secondly, PPS as a mediator is removed due to its insignificance as a mediator in Model 2. In creating Model 3, interactions of signals are added by multiplying the dummy of seller resources (0= low-resource sellers, 1=high-resource sellers) with the signals. The measurement for the seller resources was discussed in section 5.4.4. The results of interactions between signals and the seller resource levels are shown under the section “Interactions: Signals x seller resource levels” in Model 3 (Table 6.7). In interpreting the results of interactions between signals and seller resource levels in Model 3, low-resource sellers are used as the base. Hence, the results show the impact of signals for high-resource sellers compared to low-resource sellers.

Table 6.8 shows that the null hypothesis is not rejected in Model 3, meaning that the predicted model fits well compared to the

saturated model. The likelihood ratio (0.4454) for Model 3 is a lot higher compared to those for Model 1 and Model 2 (0.01 and 0.14, respectively). The Adjusted R² decreases slightly to 46%, however, most importantly, the AIC and BIC for Model 3 (38529.875 and 38808.813, respectively) decrease considerably compared to AIC and BIC from Model 1 (56030.375 and 56307.888, respectively) and Model 2 (56025.748 and 56313.172, respectively). This shows a decrease of 31% each in both the AIC and the BIC compared to Model 2. Although a slight decrease (5pp) in Adjusted R² is observed in Model 3 compared to Model 2, the substantial improvement (31%) in the AIC/BIC values and the likelihood ratio imply greater accuracy of model estimates (Maydeu-Olivares and Garcia-Forero 2010). Thus, Model 3 is accepted as the final model. Model 3 results are discussed next.

Table 6.7. Path analysis model results

LP= log of price PUP= Price Unfairness Perceptions PPS= Perceived Purchase Safety

Note: Analysis is based on buyer responses

	Model 1			Model 2			Model 3		
	PPS	PUP	LP	PPS	PUP	LP	PPS	PUP	LP
Mediation									
PPS						.016 (.012)			
PUP						.03*** (.01)		.03*** (.01)	
Signals									
Consistent location	-.09 (.053)	-.11 *** (.04)		-.09 (.05)	-.11 *** (.04)				
Preannou- ncement	-.22*** (.05)	-.07 (.04)		-.22*** (.05)	-.07 (.04)				
Fodder fed	.10*** (.02)	.12*** (.021)	-.01 (.01)	.10*** (.02)	.12*** (.021)	-.01 (.01)			
Milking	-.17*** (.06)	.30*** (.05)	-.004 (.025)	-.17*** (.065)	.30*** (.05)	-.01 (.02)			
Calves	-.02 (.05)	.09*** (.03)	.04** (.02)	-.02 (.05)	.09*** (.03)	.04** (.02)			
Product guarantee	.03 (.05)	-.07 (.043)	.01 (.02)	.03 (.05)	-.07 (.043)	.01 (.02)			
Auction method	-.32*** (.08)		.09*** (.03)	-.32*** (.08)		.09*** (.03)			
low price guarantee	.13 (.06)**	-.11** (.05)	-.01 (.02)	.13** (.06)	-.11** (.05)	-.01 (.02)			

Competitor	-.21***		.02	-.21***		.02
Qual Info	(.04)		(.01)	(.04)		(.02)
Credit	-.00003	-.00002	.00002	-	-.00002	.00002
	(.00002)	(.00001)	**	.00003	(.00001)	***
			(9.81e	(.0000		(9.81e
			-06)	2)		-06)

Interactions: Signals x seller resource levels (base=Low-resource sellers)

Product			.13	-.04	.01
guarantee			(.12)	(.10)	(.04)
Preannounc-			-.17	.14	
ement			(.12)	(.10)	
Low price			.43***	-.06	.10
guarantee			(.17)	(.13)	(.06)
Credit			.00006	.0001	.0000
			(.0000	***	2
			5)	(.0000	(.0000
				4)	1)
Consistent			-.14	-.35***	
location			(.13)	(.10)	
Fodder fed			.14**	.06	.0007
			(.06)	(.05)	(.02)
Milking			-.26	.08	-.03
			(.14)	(.11)	(.05)
Calves			.44***	.09	.08**
			(.11)	(.09)	(.04)
Auction			.07		.005
method			(.24)		(.09)
Competitor			-.13		-.001
Qual Info			(.11)		(.04)

Buyer Traits

buyer risk	.01***	-.040***	.008**	.01***	-.040***	.009**	.01**	-.05***	.01***
tendency	(.007)	(.005)	*	(.007)	(.005)	*	(.007)	(.005)	(.003)
			(.002)			(0.003)
buyer trust	.05	-.112***	.015	.05	-.112***	.019	.01	-.19***	.01
tendency	(.03)	(.03)	(.015)	(.03)	(.03)	(.015)	(.04)	(.03)	(.01)

Relationship characteristics

Buyer seller	.004	-.0009	.006**	.004	-.0009	.006**	.001	.001	.005**
relation	(.003)	(.002)	*	(.003)	(.002)	*	(.003)	(.003)	*
years			(.001)			(.001)			(001)
Ethnicity	.16***	.07	-.014	.16***	.07	-.019	.19***	.01	-.02
	(.06)	(.05)	(.026)	(.06)	(.05)	(.026)	(.06)	(.05)	(.02)

City	.012 (.04)	-.09** (.03)	-.036** (.01)	.012 (.04)	-.09*** (.03)	-.033 (.01)	.05 (.04)	-.11*** (.03)	-.05** (.01)
Bought from seller before	.01 (.05)	-.05 (.04)	-.05*** (.01)	.01 (.05)	-.05 (.04)	-.04** (.02)	-.15*** (.05)	-.14 (.04)	-.04*** (.02)
Cow/buffalo characteristics									
Cow/buffalo breed	-.08 (.05)	-.06 (.04)	-.08*** (.02)	-.08 (.05)	-.06 (.04)	-.08*** (.02)	-.09 (.05)	-.04 (.04)	-.08*** (.02)
Cow/buffalo milk (litres)	-.003 (.005)	.002 (.004)	.04*** (.002)	-.003 (.005)	.002 (.004)	.04*** (.002)	-.003 (.006)	.005 (.005)	.04*** (.002)
cons	3.53*** (.12)	2.17*** (.10)	11.3** * (.05)	3.53** * (.12)	2.17*** (.10)	11.1** * (.07)	3.47** * (.10)	2.76** * (.08)	11.1** * (.05)
***Significant at the 1 percent level **Significant at the 5 percent level									

Table 6.8. Path analysis model fit statistics.

	Model fit								
	Model 1			Model 2			Model 3		
	PPS	PUP	LP	PPS	PUP	LP	PPS	PUP	LP
Equation-level goodness of fit	9.7%	24.6%	28%	9.7%	24.6%	28.6%	6.1%	18.7%	29%
Overall Adjusted R ²)	50.9%			51.3%			45.7%		
Prob > chi2 =	0.0180			0.1412			0.4454		
AIC	56030.3			56025.7			38529.8		
BIC	56307.8			56313.1			38808.8		
Observations	1,049			1,049			986		

6.3.2 Impact Of Buyer Learning

In section 4.2.1.3, it is hypothesized that buyer learning will not eliminate the impact of resources on signals (hypothesis # 4). The bias that buyers have regarding the impact of signals on resources will endure, creating the need for sellers to communicate their unique social positions as part of their positioning strategies. Table 6.7 shows that including measures of buyer learning - such as buyer-seller relationship duration, having bought from a seller before, or buyer/seller sharing the same ethnicity - do not eliminate the role of signals, lending support to hypothesis # 4.

In this section, the impact of buyer learning on signal expectations is investigated. The purpose of the analysis is to determine how the feedback loop has created expectations over time. The analysis will show how buyer expectations are different when resource levels are removed from the analysis, and whether the resource levels seem to have an impact in determining buyer expectations or not. Table 6.7 shows that many signals used by low-resource sellers do not have a positive impact on outcomes, although many signals used by high-resource sellers have a positive impact on the three outcomes. The positive impact of signals used by high-resource sellers can indicate these signals are most observed by buyers and hence influence the feedback loop.

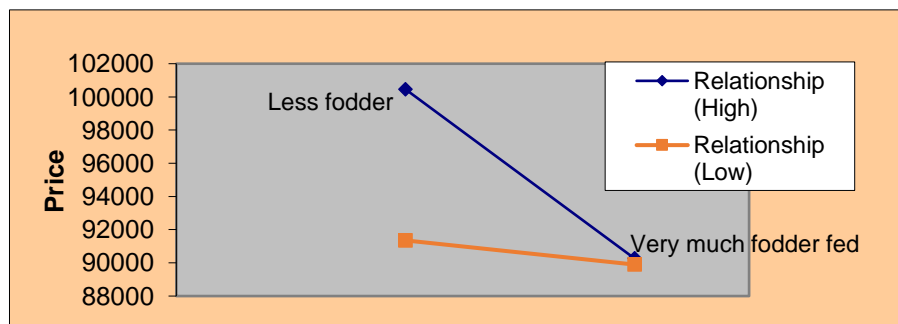
To see buyer expectations without considering resource levels, seller resources are removed from the analysis. Detailed results are shown which support the view that buyer learning does not eliminate the impact of resources on signals. Rather, market expectations are created through a feedback loop when buyers react and respond to signals over time, attaching expectations with the signals (see Chapter 2). Since resource inequalities and power differentials are an essential part of informal market dynamics, any feedback loop created with signals must incorporate the impact of seller resource levels. The results seem to support the view that signals used by high-resource sellers seem to have a role in creating buyer expectations. This is shown by both model-free analysis and regression results.

The model-free analysis shows the impact of signals for buyers that had a relationship of 2 years with sellers (i.e. relationship (low) condition) and a relationship of 6 years (i.e. relationship (high) condition). The differences between relationship durations should show the impact of buyer learning on expectations. Firstly, Figure 6.1 shows the difference in prices that sellers receive based on various amounts of fodder fed as a signal (visible investments in product care). The results show that as the buyer learning increases and buyers learn more about market conditions (i.e. buyer-seller relationship duration increases), buyers reward sellers who feed large amounts of fodder with lower prices and reward sellers that feed lower amounts with larger prices. As mentioned in the scoping-phase study (see section

5.2), shrewd sellers can manipulate fodder as a signal. Hence, more experienced buyers prefer to observe cows/buffalos that are fed lesser amount of fodder.

Results from Figure 6.1 support the study hypotheses in several ways. Firstly, it was shown in section 6.2 that sellers with high-resources use medium amounts of fodder, while low-resource sellers feed very low or very large amounts of fodder. Very low amounts of fodder reveal low quality cows/buffalos (i.e. create perceptions of sickness; see section 5.2) while feeding very large amounts of fodder creates perceptions of cheating (see section 5.2). High-resource sellers seem to feed optimal amounts of fodder. Since buyers reward sellers that feed medium to less amounts of fodder (i.e. signal used by high-resource sellers), signals used by high-resource sellers seem to influence buyer expectations (and hence the feedback loop). The results suggest that positive market expectations are created either around signals that high-resource sellers use (i.e. medium amounts of fodder) or that low-resource sellers do not understand market expectations (i.e. use wrong signals). In either case, buyer learning does not seem to reduce impact of signals on resources.

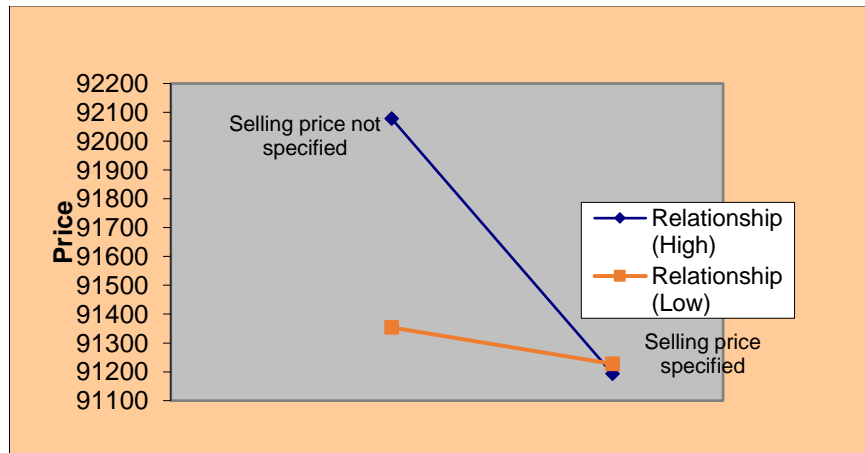
Figure 6.1. Impact of feedback loop on buyer learning: fodder fed



Similarly, results in Figure 6.2 show that buyer expectations for preannouncements are formed by high-resource seller practises. As the buyer learning increases, preannouncements which do not provide price information get a higher price. However, when buyers have lesser learning, a lower price is paid for preannouncements in which price is not provided. Since high-resource sellers have a higher mean relationship with buyers (see section 6.1.1) and are more likely to use preannouncements (and provide no price information; see section 5.2), high-resource sellers are likely to extract a higher price. On the

other hand, low-resource sellers have lesser relationship durations and also are less likely to use preannouncement signals (see section 6.2). The results from Figure 6.2 indicate that positive market expectations are created based on signals used by high-resource sellers.

Figure 6.2. Impact of feedback loop on buyer learning: preannouncements



Similar results are shown from the regression in Table 6.9. The results show the importance of the feedback loop. Contrary to what can be expected in developed markets, results show that having larger amounts of investments in product care (i.e. feeding more fodder) do not lead to higher prices. Similarly, preannouncements do not function when offered with specified prices, contrary to what can be expected in developed markets (see Chapter 2). The results show that it takes buyers long time to create expectations similar to the ones that the more experience buyers have (i.e. 6 years). The expectations that more experienced buyers make are consistent with signals that high-resource sellers use, again indicating the role high-resource sellers have in influencing the feedback loop and creating market expectations. On the otherhand, the signal which low-resource sellers are likely to use – providing a percentage of credit - does not have an interaction effect with buyer learning, showing little impact of low-resource sellers in influencing the feedback loop.

Table 6.9. Regression results showing impact of buyer learning.

Note: Analysis is based on buyer responses. Price is the dependent variable

Interactions: Signals x buyer-seller relationship (years)	Price
Preannouncements without price	120*** (50.1)
Preannouncements with price	-5.7 (76.6)
Seller feeding no fodder	2087.4 (1209.2)
Seller feeding very less fodder	1517.54** (728.6)
Seller feeding less fodder	2033.112*** (649.3)
Seller feeding medium fodder	355.6 (282.7)
Seller feeding much fodder	142.2 (449.6)
Seller feeding very much fodder	61.1 (228.8)
Impact of signals without interactions	
% of price seller allows to be repaid later	177.44*** (73.0)
Buyer market knowledge	
Relative to quality, buyer thinks prices in market are less	7574.2 (8193.0)
Relative to quality, buyer thinks prices in market are medium	16831.4** (7517.8)
Relative to quality, buyer thinks prices in market are high	22931.1*** (7639.9)
Cow/buffalo characteristics	
Local pure cow breed (Base= local buffalo pure breed)	-19578.0*** (2866.0)
Foreign pure cow breed (Base= local buffalo pure breed)	-18926.8*** (3110.7)
Local and foreign cross breed (Base= local buffalo pure breed)	-30253.1*** (3816.1)
Local cross breeds (Base= local buffalo pure breed)	-31412.59*** (3380.91)
Cow/buffalo weight	103.1*** (13.3)
Cow/buffalo milk (litres)	4930.4*** (347.9)
cons	44741.7*** (9410.5)

Observations	1,067
F(19, 1047)	36.92
R-squared	40.39%

***Significant at the 1 percent level

**Significant at the 5 percent level

The results from this section seem to support hypothesis # 4, showing that buyer learning does not seem to reduce influence of resources on signals. Rather, signals used by high-resource sellers seem to influence the feedback loop and hence form buyer expectations. However, it takes market participants relatively long periods (i.e. 6 years) to create expectations that experienced buyers make. During this period, buyers are exposed to high adverse selection and purchase risks. To help market participants adjust expectations quickly and eliminate feedback loop time, efficient methods to promote learning are required. Such methods are discussed in Chapter 7. Additionally, to create more fair expectations for low-resource sellers, interventions are needed which allow low-resource sellers to influence the feedback loop and avoid signals associated with negative expectations (e.g. lower price). These are further discussed in Chapter 7.

6.3.3 Discussion

Results from the path analysis reveal very interesting information. Firstly, the results across models show the importance of different predictor categories. Table 6.10 shows that relationship characteristics explain around 11% of the variation. Adding buyer characteristics increases variation explained by 11%, taking the total variation explained to 22%. Adding cow/buffalo characteristics increases the total variation explained to 40%, an increase of 18%. Given that the variation explained in our final model is around 46% when signals are added, signals cause an increase of 6% in variation explained. The changes in variations show that the two categories - buyer characteristics, and relationship characteristics - each explain around 11%-12% of the variation. However, cow/buffalo characteristics explain around 18% of the variance, around 50% more than each category. This shows that cow/buffalo characteristics are

the most important factors that influence outcomes in informal markets.

Signals, relationships, and buyer characteristics all have an impact on outcomes, showing that transaction outcomes in informal markets are determined by a range of factors. Given that non-signal categories explain 40% of the model variation (compared to the total model variation of 46%), non-signal factors explain around 86% of the total variation, while signals explain around 14% of the total variation. Variation explained by signals could have been higher if many of the EB signals had a significant impact. However, due to the relatively poor reputation of low-resource sellers, EB signals seem to have little impact on the three outcomes. This is discussed in detail in Chapter 7.

Table 6.10. Variation explained by predictor variable categories.

Predictors	Variation explained
Relationship characteristics	11%
Buyer characteristics and relationship characteristics	22%
Buyer characteristics, relationship characteristics, and cow/buffalo characteristics	40%

PPS. Results from Model 3 show that a wide range of signals influence buyers' Perceived Purchase Safety, with no cow/buffalo characteristic influencing PPS.

Consistent locations. Contrary to expectations, no impact on PPS is observed. It was expected that PPS will increase when low-resource sellers choose consistent locations since consistent seller locations allow buyers to spread negative WOM in case quality is lower-than-expected. *Fodder fed.* Consistent with expectations, fodder fed increases PPS for high-resource sellers. Feeding fodder can increase PPS for high-resource sellers because feeding fodder not only showcases financial investments (fodder is expensive) but also demonstrate cows' or buffalos' health (healthier cows/buffalos eat large amounts of fodder). *Wide distribution network (Calves attached).* Consistent with expectations, high-resource sellers increase PPS when calves are attached. It is important to note that this is treated as

a pseudo-signal in the market when used by low-resource sellers. However, the signal reflects wide distribution networks of high-resource sellers (please see Chapter 5). High-resource sellers are deemed credible when offering the signal, since their social position and power do not create perceptions of abusing the signal.

LPGs. Contrary to expectations, *LPGs* increase PPS for high-resource sellers, but not for low-resource sellers. It is possible that, as discussed previously, low-resource sellers are more likely to use signals that are associated with fraudulent practices, such as milking, making their *LPG* offers less credible. Similarly, low-resource sellers' cows/buffalos can also be associated with lower quality, which can increase post-purchase problems (like lower milk yield or hidden diseases, etc.). Furthermore, the ability of low-resource sellers to fulfill warranty obligations might be questionable, either due to credibility issues or lack of financial resources to reimburse buyers. For instance, due to limited financial resources and perceived lower quality (which increases the need for warranty redemption), low-resource sellers cannot easily compensate the buyers. The meagre financial assets that low-resource sellers possess, in addition to their reliance on credit to purchase cows/buffalos, can reduce the credibility of the *LPG* signal for low-resource sellers (please see Chapter 5).

Competitor Quality Information, product guarantees, milking allowed, and auction method. Consistent with expectations, providing competitor quality information, product guarantees, allowing milking, and using auction method to state price do not influence PPS

Results show that buyer-seller sharing an ethnicity increases PPS. The measure controls for buyer learning, showing that buyer learning does not seem to reduce buyer bias associated with seller resource levels. Comparing the effect sizes, it can be seen that offering *LPGs* and attaching calves have the largest magnitude of effect. Having the same ethnicity seems to have half the magnitude of effect compared to offering *LPGs* and attaching calves, with feeding fodder having the lowest impact.

PUP. Results from Model 3 show that signals impact Perceived Unfairness Perceptions differently compared to their impact on Perceived Purchase Safety.

Consistent location. Contrary to expectations, consistent locations reduce PUP for high-resource sellers, not for low-resource sellers. Choosing consistent locations makes it easy to spread negative WOM. However, as was discussed in section 6.2., low-resource sellers are twice less likely (42%) to choose consistent locations compared to high-resource sellers (85%). A plausible explanation for the result can be inferred from the scoping-phase study. During the scoping-phase study, it was observed that many sellers did not choose consistent locations. The reason is that the cattle market is a negotiation-based context, where buyers and sellers haggle over the price etc. As a result, many sellers move around the market to gain knowledge of market conditions and be in a better position to negotiate. It is quite likely that low-resource sellers mostly move around the market, since the lesser number of cows/buffalos allows them to move around more easily, compared to high-resource sellers that have more cows/buffalos, making it difficult to move around the market.

Fodder fed, and LPGs. Contrary to expectations, feeding fodder, and LPGs do not influence PUP. These results can be attributed to the previously discussed tendency of sellers to overstate prices after making incremental improvements in the product (i.e., cows/buffalos). For instance, in the scoping-phase study, it was observed that when sellers apply oil to or polish horns of cows/buffalos, they charge higher prices for these trivial and low-cost cosmetic improvements. Similarly, when sellers feed fodder or attach calves, they can charge unjustifiably higher prices, eliminating expectations of providing price fairness information through the signals. Moreover, to negotiate a better price, sellers can simply inflate prices unjustifiably when using these signals.

Percentage of credit offered. Consistent with expectations, when low-resource sellers offer credit, PUP decreases while PUP increases for high-resource sellers.

Product guarantees, milking allowed, and preannouncements.

Consistent with expectations, product guarantees, preannouncements, and allowing milking does not influence PUP.

Buyer-seller sharing the same city decreases price unfairness perceptions, possibly because it makes it easier to locate the seller and spread negative WOM. The measure controls for buyer learning, showing that buyer learning does not seem to reduce buyer bias associated with seller resource levels. Very importantly, no cow/buffalo characteristics influence PUP.

Price. Results from Model 3 show that consistent with expectations, attaching calves (i.e. wide distribution networks) increases the price for high-resource sellers. As theorized, attaching calves can demonstrate the reproduction capacity of the cow/buffalo, which is a direct indicator of milk-giving capacity. It also shows the presence of wide distribution networks, which allow justifying higher prices. This can greatly help during negotiations. Additionally, consistent with expectations, providing competitor quality information, using auction method to state price, milking, and offering product guarantees do not influence the price. However, contrary to expectations, the percentage of credit offered does not influence the price.

Another important point to note is that cow/buffalo characteristics influence the price. The greatest increase in price occurs when the milk capacity (litres) increases. Each 1 litre increase in milk capacity has a magnitude impact that is half of attaching calves. Given that on average a cow/buffalo provides between 10-12 litres of milk (see section 6.1 and section 6.2), small improvements in milk capacity can create large price gains. The price model shows that price is mostly influenced by the demonstration of cows' or buffalos' quality, with little influence of signals. Furthermore, the impact of buyer-seller sharing the same city, or having bought from the seller before, in decreasing price seems to reflect cultural dynamics where relationships result in selling at discounts or a lower price. Moreover, an increase in price with buyer-seller relationship duration shows that buyers are more willing to trust sellers with whom they have a

relationship, again showing the importance of relationships. The buyer-seller relationship measures control for buyer learning, showing that buyer learning does not seem to reduce buyer bias associated with seller resource levels.

Mediation. Results from Model 3 lend support to expectations (see section 4.2.1.4) that PUP and PPS do not increase price. This seems to support the notion that a separate set of signals are associated with PPS, and that higher seller credibility does not lead to higher prices. This is because PPS measures sellers' credibility or reliability in delivering quality-as-expected, whereas price relates to product attributes (e.g., milk capacity). In other words, PPS is about the seller, whereas price is about the cow/buffalo being sold.

In sum, the empirical model lends support to many hypotheses, while rejecting many too. Table 6.11 provides a summary of the hypotheses that are supported. The table shows that hypotheses relating to low-resource sellers and EB signals are mostly unsupported.

Table 6.11. Summary of hypotheses results. Hypotheses relating to EB signals are mostly unsupported.

Hypothesis #	Signals	Outcome
# 1A (Positive impact of PR signals on PPS)	<i>Visible investments in product care (Fodder fed)</i>	Supported
	<i>Wide distribution network (Calves attached)</i>	Supported
# 1B (Positive impact of EB signals on PPS)	<i>Consistent locations</i>	Not supported
	<i>LPG</i>	Not supported
	<i>Percentage of credit</i>	Supported
# 2A (PR signal decreases PUP)	<i>Visible investments in product care (Fodder fed)</i>	Not supported
# 2B (EB signals decrease PUP)	<i>Consistent locations</i>	Not supported
	<i>LPG</i>	Not supported
	<i>Percentage of credit</i>	Supported
# 3A (PR signal increases price)	<i>Wide distribution network (Calves attached)</i>	Supported
# 3B (EB signal increases price)	<i>Percentage of credit</i>	Not supported
# 4 (Buyer learning will not reduce role of resource levels)		Supported
Supplementary Analysis		
Section 4.2.1.4 (PPS and PUP will not influence price)	<i>PPS: Mediator</i> <i>PUP: Mediator</i>	Supported Supported

Section	<i>Competitor quality information</i>	Supported
5.2.6 (Non-WOM	<i>Product guarantees</i>	Supported
signals will not	<i>Auction method</i>	Supported
influence outcomes)	<i>Milking allowed</i>	Supported
	<i>Product preannouncement</i>	Supported
	<i>High price</i>	Supported

In the next section, the model results are discussed in detail and are used to devise optimal signaling strategies for informal market sellers.

Chapter 7: Discussion & Conclusion

To understand how signals can reduce adverse selection and help sellers adopt unique positioning strategies, it is important to identify the process through which buyers, sellers, and signals interact. This process must describe the key stages of the interaction, the outcomes of the interactions, and the factors that inhibit this process. In chapter 1, a process-based approach visualizes the key elements of the buyer-seller interaction, showing the importance of signals in reducing adverse selection and adopting unique seller positioning strategies. The process-based approach identifies the impact of signals on three outcomes: Perceived Purchase Safety (PPS), Price Unfairness Perceptions (PUP), and seller profits. Additionally, the propagation medium is identified as a key factor that can inhibit or enable signals. Based on signals that can function in informal markets, a new signaling framework is presented. In Chapter 4, hypotheses show the impact of signals on outcomes. In Chapter 6, model-free results and path analysis modeling shows the impact of signals on the three outcomes.

Results from the empirical model, the t-tests, and the variance analysis from Chapter 6 reveal interesting information about informal markets. In this chapter, a summary of the main conclusions that are derived from the study is provided. The implications of the results are analyzed, both from a theoretical lens and from a practical viewpoint. While discussing the study results, it can be seen that the study directly addresses Moorman's (2018) call to understand the "role and nature" of marketing in the informal markets, and Chandy and Narasimhan's (2015) call to understand how informal market sellers differentiate themselves from the competition. Specifically, the study makes important contributions to theory on informal markets and the literature on signals. Additionally, the study provides guidelines for practitioners in the form of optimal signaling strategies. The optimal signaling strategies help lower the three obstacles that informal market sellers face: low perceptions of credibility/reliability, high perceptions of unfair prices, and low prices (i.e., low profits).

The chapter starts by discussing the lack of signaling opportunities for low-resource sellers in informal markets, showing that low-resource sellers are disadvantaged in informal markets simply due to the low financial resources they possess. To resolve the challenges that informal market sellers face, optimal signaling strategies are proposed. Afterward, the contribution of the study to existing work on informal markets and signaling is discussed. When discussing the managerial implications, the study discusses how informal market sellers can leverage unique informal market dynamics, signals and non-signals, to achieve the three key outcomes.

7.1 Theoretical Implications

First, the lack of signaling opportunities and inherent disadvantage created by lower resources is discussed.

7.1.1 Lack Of Signaling Opportunities For Low-Resource Sellers

Table 7.1 shows the impact of signals on the three outcomes. From Table 7.1, it is obvious that except for offering credit, no signal benefits low-resource sellers in informal markets. It was theorized that low-resource sellers will gain from using EB signals, while high-resource sellers will gain from using PR signals in informal markets, but that high-resource sellers will not use EB signals to avoid perceptions of low resources. However, the study results show that while high-resource sellers gain from using PR signals, they also gain from using several EB signals. For instance, high-resource sellers gain from using consistent locations and LPGs as signals.

Table 7.1 *Impact of signals on outcomes: using low-resource sellers as the base, the table shows how high resource sellers gain/lose from using signals.*

Signals	Impact		
	PPS Focus: Seller Credibility /Reliability	PUP Focus: Transaction risk	Price Focus: Negotiation
<i>Competitor quality information</i>	No impact		No impact
<i>Consistent locations</i>	No impact	- (High-resource sellers)	

<i>Fodder fed</i>	+	No impact	
	(High-resource sellers)		
<i>Milking Calves attached</i>	No impact	No impact	No impact
	+		+
	(High-resource sellers)		(High-resource sellers)
<i>Auction method LPG</i>	No impact	No impact	No impact
	+		
	(High-resource sellers)		
<i>Product preannouncements</i>		No impact	
<i>Product guarantees</i>	No impact	No impact	No impact
<i>Credit</i>	No impact	+	No impact
		(High-resource sellers)	

A question that arises is, why do low-resource sellers in informal markets not gain from using the EB signals? There are many potential explanations. Firstly, low-resource sellers have a lesser likelihood of using many EB signals. For instance, as shown in Chapter 6, 85% of high-resource sellers choose consistent locations (vs 42% low-resource sellers), 48% of high-resource sellers provide competitor quality information (compared to 30% of low-resource sellers), 47% of high-resource sellers preannounce (compared to 25% of low-resource sellers), and 35% of high-resource sellers offer product guarantees (compared to 24% of low-resource sellers). Thus, the tendency of low-resource sellers in informal markets to use EB signals is less.

Secondly, the low resource itself seems to be associated with higher levels of distrust. Table 7.2 shows that low-resource sellers are more likely to be perceived as having unfair prices (34%) compared to high-resource sellers (20%), while high-resource sellers have a higher likelihood of offering prices commensurate with quality (69%) compared to low-resource sellers (57%).

Table 7.2 *Price Unfairness Perceptions for sellers with different resource levels*
Note: Values are based on buyer responses

	High-resource seller	Low-resource seller	t-stat
Seller offers prices higher than quality	20.11%	33.93%	3.1***

***Significant at the 1 percent level

The data in many ways supports the view that low-resource sellers are associated with higher levels of distrust. For instance, low-resource sellers seem to be using signals that are associated with manipulation and short-term gains. While a higher proportion of low-resource sellers feed less fodder (37%) or large amounts of fodder (31%) compared to high-resource sellers (26% and 20%, respectively), high-resource sellers are twice likely to feed medium amounts of fodder (51%) compared to low-resource sellers (25%) (please see Chapter 6). As was mentioned in Chapter 5, the signal can be easily manipulated when buyers artificially increase fodder consumed by cows/buffalos. This can occur when cows/ buffalos are kept hungry for long durations or are fed hunger-inducing spices, making cows/buffalos consume more fodder and appear healthier when they are in the market. On the other hand, feeding less fodder can create concerns among buyers, because cows/buffalos that eat very little fodder are unhealthy and sick. Buyers in the market are wary when cows/buffalos are fed very little or very large amounts of fodder, creating perceptions of lower credibility for low-resource sellers. However, high-resource sellers feed optimal amounts of fodder, both signaling their financial investments and demonstrating cow/buffalo health. Low-resource sellers, on the other hand, use the signal at extremes (i.e., too much or too less), creating perceptions of unfairness.

Another manipulatable signal that low-resource sellers use in abundance is allowing milking. Allowing buyers to milk the cows/buffalos is a form of product trial. As mentioned in Chapter 5 and Chapter 6, this signal can be easily manipulated, when sellers can inject false milk into the udders of cows/buffalos, generating large amounts of milk when in the cattle market. However, after the buyer buys the cows/buffalo and milk in the udder decreases, the cow/buffalo provides lower milk. Buyers generally distrust this signal. As was shown in Chapter 6, low-resource sellers have a higher likelihood (87%) of using this signal compared to high-resource sellers (71%). It is possible that since low-resource sellers have a higher likelihood of using signals associated with manipulation, this leads to a lower reputation, decreasing credibility for EB signals that low-resource

sellers use. As was discussed in Chapter 2 and Chapter 3, reputation is a high-scope cue that transfers perceptions to low-scope cues (i.e. signals). Since low-resource sellers seem to have a lesser reputation, EB signals they use are also deemed less credible. In sum, due to the use of easily manipulatable signals - extreme amounts of fodder and milking – low-resource sellers seem to be associated with higher levels of distrust.

Other data also point out that low-resource sellers are associated with higher levels of distrust. Previously, the lesser likelihood of low-resource sellers in choosing consistent locations was cited as a potential reason for consistent locations not benefiting the low-resource sellers. However, low-resource sellers do not benefit from using LPGs as signals, even when a higher proportion of low-resource sellers use LPGs (16%) compared to the high-resource sellers (12%). This shows that even when buyers have a higher likelihood of interacting with signals used by low-resource sellers, the signals are not deemed credible. Additionally, buyer-reported estimates of average cow/buffalo milk capacity also differ with seller resource levels: the average expected milk capacity is higher for high-resource sellers (12 litres) compared to low-resource sellers (10 litres), controlling for cow/buffalo characteristics. In sum, low-resource sellers are associated with higher levels of distrust in the market.

On the other hand, it can be observed that high-resource sellers are deemed more credible and trustworthy in the market. These benefits accrue due to the privileged position of high-resource sellers in the market, consistent with Khandan (2017) and Acemoglu and Robinson (2012)'s analysis. When high-resource sellers offer LPGs, feed fodder, choose consistent locations, or attach calves, positive outcomes are generated. Overall, the results support the argument of the study: low-resource sellers are seen as unimportant and offering lower quality, while high-resource sellers are viewed positively in informal markets. PR signals positively impact high-resource sellers, while low-resource sellers do not benefit from EB signals, primarily because of the low reputation that low-resource sellers have, as discussed previously. This raises the importance of optimal signaling

strategies, especially for low-resource sellers, that can increase the positive impact on the three key outcomes. These are discussed next.

7.1.2 Optimal Signaling And Positioning Strategies For Informal Market Sellers

Table 7.1 provides a summary of signals and their impact across outcomes for sellers with different resource levels. As discussed in section 7.1.1, except for the percentage of credit, no EB signals benefit low-resource sellers, while fodder fed, LPGs attaching calves, and consistent locations benefit high-resource sellers.

For high-resource sellers, the numerous signals that positively influence the three key outcomes provide a lot of flexibility in choosing a bundle of signaling strategies. Specifically, high-resource sellers can use calves attached, fodder fed and LPGs to increase credibility/reliability. They can use consistent locations to reduce price unfairness perceptions and attach calves to increase the price. In this scenario, high-resource sellers are using a combination of PR and EB signals, showing that high-resource sellers can use some EB signals in combination with PR signals to create a separating equilibrium and gain the highest positive impact on the three outcomes. Hence, high-resource sellers can use a variety of signals that (1) reduce adverse selection, (2) create a separating equilibrium, and (3) form unique positioning strategies that showcase social positions. Since the separating equilibrium is long-lasting, high-resource sellers can maintain unique positioning strategies without the threat of mimicry from low-resource sellers.

For low-resource sellers, an optimal signaling strategy is more challenging. Since low-resource sellers suffer from a poor reputation, signals they use do not produce positive outcomes, consistent with findings of Purohit and Srivastava (2001), who show that a high-scope cue (i.e., reputation) adds credibility to a lower-scope cue (i.e., signals; please see Chapter 2). The only exception is the use of a percentage of credit, which directly shifts risks from buyers to sellers. Offering a percentage of credit does not require a strong reputation. Since a buyer can simply avoid paying the remaining price, a percentage of credit is the only signal that sellers with a low reputation can use. If

low-resource sellers use signals that high-resource sellers use, such as fodder fed or calves attached, no positive outcomes are observed, since the usage of these signals by low-resource sellers is associated with fraudulent practices, as mentioned previously. The question that arises is, how can low-resource sellers increase credibility/reliability and price? It seems that no signal options are present which can positively benefit low-resource sellers on these outcomes.

The best strategy for low-resource sellers it seems is to offer a percentage of credit and at the same time attempt to build a reputation that can add credibility to other signals. For this purpose, low-resource sellers should avoid signals that are associated with manipulation and which low-resource sellers are most likely to use, such as feeding extreme amounts of fodder, allowing milking, and attaching calves. At the same time, low-resource sellers should choose consistent locations, which will increase the likelihood of damaging their reputation through negative word-of-mouth, creating higher perceptions of price fairness. It is important to note that although low-resource sellers can offer a percentage of credit to gather higher price fairness perceptions, no feelings of emotional attachment or seller benevolence are generated, due to a lack of positive impact on PPS (see Table 7.1) or price.

This contrasts with work by Viswanathan, Rosa, and Ruth (2010), who show that personal and business relations are intertwined in informal markets. Sellers from the lowest strata fulfil the emotional needs of others by offering sacrifices, such as credit, to create feelings of emotional attachment and benevolence. Lack of the credit signal in increasing low-resource sellers' credibility/reliability shows that low-resource sellers are not benevolent or emotionally attached with buyers, reducing the impact of a percentage of credit as a signal. One reason why informal market sellers can lack emotional attachment with buyers is provided by Jachimowicz et al (2020), who show that financial inequality leads to perceptions of competitiveness, which can increase status threat and make it less likely to ask others/offer help (please see Chapter 3). As a result, low-resource informal market sellers are less likely to offer help. For this reason, when low-resource sellers offer a percentage of the price as credit, it is seen as a business

clause, rather than a sign of emotional attachment. Hence, unless low-resource sellers establish a strong reputation based on benevolence and being a responsible/trustworthy member, they cannot use signals which increase credibility/reliability and price.

Once low-resource sellers establish a high reputation, they can derive benefits from many EB signals that high-resource sellers do not benefit from (i.e. to create a separating equilibrium and to adopt unique positioning strategies), such as preannouncements, percentage of credit, and milking. In addition to balancing between outcomes optimally, using the signal strategies mentioned above will reduce reliance on pseudo-signals, which are mostly associated with low-resource sellers in informal markets and damage low-resource seller reputation, as mentioned previously.

Table 7.3 shows the optimal signaling strategies for low-resource and high-resource sellers.

Table 7.3 *Optimal signaling strategies in informal markets.*

	Low-resource seller	High-resource seller
<i>Consistent locations</i>		✓
<i>Fodder fed (Visible investments in product care)</i>		✓
<i>LPG</i>		✓
<i>Calves attached (Wide distribution networks)</i>		✓
<i>Credit</i>	✓	

For high-resource sellers, providing LPGs, feeding fodder, attaching calves, and choosing consistent locations is the optimal strategy. While using LPGs will increase seller reliability/credibility only, feeding fodder will increase seller credibility/reliability and also increase cow/buffalo milk capacity, leading to higher prices. In Chapter 3, it was theorized that high-resource sellers will use signals that exhibit their power and financial strength, while low-resource sellers will use signals that showcase emotional bonds and willingness to sacrifice for others. Study results support the theory in general, although some differences are observed. As mentioned previously, high-resource sellers exclusively benefit from using PR signals and a

few EB signals as well. However, low-resource sellers use EB signals but do not derive any benefits owing to their lower reputation. Both the low-resource and high-resource sellers use different signals, creating a separating equilibrium in the market and adopting unique positioning strategies. Unfortunately, for low-resource sellers, these strategies do not appear to help them achieve greater success due to the factors discussed above. Further, as theorized, low-resource sellers cannot use PR signals since no impact is observed for PR signals when used by low-resource sellers.

It is also important to note that although LPGs are an EB signal and do not require financial investments, LPGs can showcase wealth. Although fulfilling LPGs should be easy to implement for low-resource sellers – paying for the difference between product price and market price should be affordable – LPGs can require the presence of financial resources to make the signal credible. Additionally, high resources seem to lower LPG redemption costs. These costs arise when buyers/sellers dispute the LPG claims (please see Chapter 2).

The presence of financial resources can decrease warranty redemption costs for several reasons. Firstly, a high reputation can carry an implicit guarantee, as shown by Wirtz, Kum, and Lee (2000) (please see Chapter 2). Secondly, even though high-resource sellers concentrate power and financial resources in informal markets, they must maintain a positive standing in society to avoid unrest and are thus most likely to contribute to charitable and religious welfare organizations. While feudal and agricultural landlords tend to oppose education or developmental programs that can reduce inequality, they also make most efforts to increase welfare in informal markets (Hossain and Moore 2002). Hence, high-resource sellers are more likely to accept LPG refund requests and fulfil these with a minimum of delays, consistent with Khandan (2017)'s behavioral analysis of influential groups in the informal markets.

As mentioned before, informal markets are heterogeneous. Signals that apply in the cattle market, such as calves attached or fodder fed, may not apply in other informal markets (e.g. in a fruit/vegetable market). However, by categorizing signals, the study

has made it easy to contextualize signals for the heterogeneous informal markets. Regardless of the informal market type, high-resource sellers can exclusively use PR signals, such as expensive product packaging and wide distribution networks (which are reflected by calves attached in cattle markets; please see Chapter 5). Additionally, high-resource sellers can benefit from using LPGs and choosing consistent locations (EB signals). Using these PR and EB signals should be easy for high-resource sellers across all informal market types. Similarly, using a percent of the price as credit should be straightforward to implement across all informal market types, showing the generalizability of the optimal signaling strategies and their utility in creating unique positioning strategies.

Next, the importance of non-signals and the role of individual signals are discussed.

7.1.3 Importance Of Signals And Non-Signals

Results from Chapter 6 (summarized in Table 7.1) show that many signals play an important role in influencing PPS and PUP. For PPS, many signals have a significant impact, although the positive impact is observed only for high-resource sellers. For both PPS and PUP, no cow/buffalo characteristics have a significant impact. For instance, milk capacity or breed information did not affect PPS. On the other hand, in increasing price - except for attaching calves that provide an advantage during negotiations - cow/buffalo quality characteristics have the most significant impact. This shows that in informal markets, signals carry expectations that are associated with seller intentions, not product quality. For instance, PPS reflects a sellers' intention not to delude buyers, while PUP reflects a sellers' intention not to charge unfairly.

On the other hand, price is determined by (1) either the negotiation skills of sellers or by (2) quality characteristics of cows/buffalos. This result seems contrary to the original tenets of Signaling Theory that were provided by Akerlof (1970) and Spence (1973). While Akerlof (1970) and Spence (1973) do not dispute that price is influenced by inherent characteristics of the product, signals

are present which provide information about the suitability of quality. As a result, the presence of these signals should be associated with a payoff - a reward – for the sellers. However, study results do not show a payoff associated with signals, other than when calves are attached.

The stark differences mentioned above show that signals which can influence price are not present in informal markets. Milk capacity is the quality characteristic with the highest impact on price. As discussed in Chapters 4, 5, and 6, milk capacity can be manipulated easily in the short term, along with calves attached. Although signals by nature should vary, they should not vary at such low costs and with such ease to render them unworthy of providing information to buyers. However, both milking and attaching calves can be varied at very low costs with great ease. Thus, all variables that the study finds can influence price are easily manipulated and do not provide reliable quality information.

Overall, signals that are associated with price expectations are absent in informal markets. Furthermore, path analysis shows that higher Perceived Purchase Safety does not lead to a higher price, since both PPS and price are influenced by different underlying mechanisms: PPS measures credibility or reliability of sellers in delivering quality-as-expected, while price relates to product attributes (e.g., milk capacity) (see section 4.2.1.4).

A signal associated with seller intentions provides little information about product attributes. This is consistent with findings from the signaling literature. For instance, advertisements decrease buyers' financial and privacy risks, while having no impact on seller benevolence, credibility, or trustworthiness (Aiken and Boush 2006; Biswas and Biswas 2004). However, advertisements increase firm stock prices (Du and Osmonbekov 2019). Although the advertisements literature cited above shows that advertisements do not affect sellers' intentions but affect quality perceptions, the present study results show a different effect: signals in informal markets affect sellers' intentions, but not prices.

The result - that signals affect seller intentions but not price - can be explained by the original tenets of Signaling Theory (Spence

1973), which states that signals form over time when signal receivers repeatedly interact with signals and create expectations (i.e., through a feedback loop). It appears that in informal markets, signal receivers have not interacted with signals that allow creating expectations of cow/buffalo quality, reflecting a weak feedback loop system. The prevalence of pseudo-signals, like milking and attaching calves, shows that signaling cow/buffalo quality (i.e., product attributes) is still in its infancy stage.

The empirical models also show that relationship variables influence each of the three outcomes, consistent with studies by Viswanathan, Rosa, and Ruth (2010) and Yeung, Desai, and Jones (2018) that show the importance of relationships in influencing business outcomes. For instance, the same buyer-seller city decreases price and price unfairness perceptions, reflecting cultural dynamics where relationships lead to discounted or fairer prices. The threat of negative WOM also increases the need to deal with relationships more fairly. When buyer-seller share the same ethnicity, PPS increases too, showing that relationships are less likely to cheat others. The effect sizes of relationship variables can be larger than the effect sizes of signals. For instance, having the same ethnicity can increase PPS by a larger magnitude compared to feeding fodder.

The importance of relationship variables shows that sellers or firms across all informal market types establish close, informal relationships with buyers. Similarly, buyers in informal markets gain better and fairer prices if close relationships with sellers are established. In sum, signals in informal markets are associated with seller intentions, while easily manipulatable quality characteristics are associated with prices, with no signals influencing price (except for attaching calves, which can be easily manipulated by low-quality sellers). As discussed in Chapter 5, since calves attached showcase a wide distribution network, sellers across all informal markets can showcase wide distribution networks to gain a higher price. For instance, fruit/vegetable sellers can showcase the presence of many workers, transporters, or growers as part of their distribution network. Sellers of food items can showcase cooks, suppliers, or other members as part of their distribution networks. Relationship variables,

on the contrary, influence both seller intentions and prices, showing the importance of maintaining strong, emotional attachments with buyers or sellers in informal markets.

After having discussed why signals can affect both PPS and PUP, but not price, the study synthesizes results from Chapter 5 and Chapter 6 to discuss the combined impact of each signal across the three outcomes. Contributions of the study to existing signaling literature are also discussed.

7.1.4 Holistic Impact Of Signals

In this section, the impact of each signal on the three outcomes is discussed in detail, along with the contribution of the findings to existing research.

High price. Consistent with expectations, price does not influence PUP or PPS (see Chapter 6). As discussed before in the scoping-phase study (see Chapter 5), sellers tend to overquote prices, especially when facing inexperienced buyers. As a result, low-quality sellers can gain profits in period 1 by charging very high prices, eliminating the need to resell in period 2 (i.e. the future) and leave the market altogether. Hence, the price signal loses its value. This is consistent with Kirmani and Rao (2000)'s study, which shows that prices can lose signaling value when sellers can gather high profits in period 1 and leave the market. As mentioned in Chapter 5, the cattle market of study presents a negotiation context where sellers raise prices with expectations to negotiate and lower the prices later. In informal markets that do not involve negotiations, such as when fruits/vegetables are sold by low-resource street vendors at stated prices, high prices can function as signals. Thus, informal market sellers in non-negotiation contexts can use high prices as a signal.

Consistent location. Contrary to expectations, when low-resource sellers choose a consistent location, no impact on the three key outcomes is observed. As was discussed previously, the low reputation and lower likelihood of choosing consistent locations of the low-resource sellers can explain this outcome. However, the positive impact of choosing a consistent location is observed for high-resource

sellers, who experience a decrease in price unfairness perceptions (i.e., increases fairness perceptions). The outcome is consistent with what the study theorized, although the outcome was expected for low-resource sellers. Nevertheless, the mechanism leading to the outcome is similar to what was theorized.

The study theorized that consistent seller locations allow buyers to spread negative WOM in case quality is lower-than-expected, improving price fairness perceptions. Since price fairness perceptions relate to transaction risk, finding a seller easily reduces transaction risks since buyers can interact with sellers easily or spread negative WOM if the quality is lower-than-expected. This is consistent with the role that was hypothesized for consistent locations, although it was expected that only low-resource sellers will use this signal.

On the other hand, choosing a consistent location does not influence reliability/credibility perceptions. This can be explained by the unique informal market dynamics that were uncovered during the scoping-phase study. Since the informal markets represent a negotiation-based context where buyers and sellers haggle over prices, many buyers and sellers move around the market to gather market information, increasing market knowledge and expertise. So, choosing consistent locations is not associated with seller credibility/reliability. Instead, consistent locations lower purchase risks by allowing the spread of negative word-of-mouth, as hypothesized. Informal market sellers looking to increase price fairness perceptions should prefer to choose consistent locations.

Competitor quality information. As expected, providing competitor quality information does not influence PPS. The signal was included in the analysis since many sellers are using the signal, creating the need to determine the signals' impact. Consistent with expectations and with analysis of Trifts and Häubl (2003) and Liberali, Urban, and Hauser (2013) (please see Chapter 2 and Chapter 3), providing competitor quality information requires an information technology format that allows ease of comparisons, something which lacks in informal markets. Secondly, it was learned during the scoping-phase study that, since the cattle market presents a negotiation

context, buyers do not expect sellers to provide much information. Rather, expert sellers retain crucial information which provides negotiation advantages. These norms can be caused by power and resource inequalities that increase competitiveness and lower propensity to help, as shown by Jachimowicz et al (2020). In sum, providing too much information is associated with a perceived lack of seller experience and amateur behavior.

Since informal markets usually lack access to information technology-driven interfaces that allow ease of comparisons, informal market sellers are advised to avoid providing competitor quality information. Additionally, providing too much information might violate informal market norms and might be perceived as amateur behavior.

Preannouncements. Consistent with expectations, no impact on outcomes is observed. While low-resource sellers use this signal less often, high-resource sellers observe no impact either. The absence of impact of preannouncements for high-resource sellers is consistent with Eliashberg and Robertson (1988)'s analysis, showing that if sellers with already existing products in the market preannounce, cannibalization risks increase. In developed economy markets, preannouncements provide beneficial outcomes when they inform about a product's development stage or provide a fixed price in advance (see Chapter 2 and Chapter 3). However, in the case of informal markets, since sellers do not inform about price in advance (to keep an advantage during negotiations), preannouncements lose importance. This is consistent with Sorescu, Shankar, and Kushwaha (2007)'s analysis which shows that preannouncements work when specific information is provided. However, if price information is not provided, preannouncements seem to lose importance. Additionally, since the cattle market represents a negotiation context where prices are likely to be negotiated over, the preannouncement signal loses importance, since preannouncement signals lose importance when the information provided can be reversed, consistent with Robertson, Eliashberg, and Rymonm (1995)'s analysis.

In sum, informal market sellers across all market types should avoid preannouncements (a) if no price information is provided and (b)

if prices are likely to be re-negotiated. On the other hand, if offering preannouncements, informal market sellers should preannounce prices and not change prices afterward.

Credit. Consistent with expectations, offering credit increases price fairness perceptions for low-resource sellers, while increasing price unfairness perceptions for high-resource sellers. In the case of low-resource sellers, a decrease in price unfairness perceptions reflects the impact of credit in decreasing transaction risk, since buyers can choose not to return the remaining price if the quality is inadequate. However, no impact on credibility/reliability is observed, contrary to findings by Viswanathan, Rosa, and Ruth (2010) (please see section 7.1.2), although it was expected that emotional attachment and feelings of benevolence should be created and increase credibility/reliability. The inability of the credit signal in increasing low-resource sellers' credibility/reliability shows that low-resource sellers are not benevolent or emotionally attached with buyers, reducing the impact of credit as a signal. On the contrary, offering credit is seen as a business clause, rather than a sign of emotional attachment. Hence, low-resource sellers need to establish a strong reputation based on benevolence to increase credibility/reliability and price by using credit as a signal.

For the high-resource sellers, offering credit increases price unfairness perceptions, possibly because high-resource sellers may add unjustifiably high markups - like an interest markup - when offering credit. Additionally, since high-resource sellers have relationships within government departments (e.g., police, tax authorities), buyers may tend to avoid taking credit from them, since non-payment of the remaining price can lead to altercations with government departments (e.g., police, etc.), increasing buyer risks. This is consistent with Khandan (2017)'s findings, which show that informal market sellers avoid chances of interacting with governments in informal markets

In sum, low-resource informal market sellers should establish a reputation based on emotional attachment/benevolence and then offer credit to derive the full benefits of using the signal.

Calves. As expected, attaching calves increase PPS and price for high-resource sellers, showing that it demonstrates financial resources, wide distribution networks, and greater care of the product (see Chapter 4), in addition to helping during negotiations. However, attaching calves does not benefit low-resource sellers, possibly due to the widespread use of fake calves by low-resource sellers (see Chapter 4). Although this signal is specific to the cattle-market context, sellers in other informal market types can derive similar benefits by investing in and showcasing their wide distribution networks (see Chapter 4).

Auction method to state price. Consistent with expectations, using the auction method to state price does not impact outcomes (see Chapter 4 and Chapter 5). This is because the auction method to state price needs some information-technology-driven interface that makes the signal transparent, consistent with Li, Srinivasan, and Sun (2009)'s findings (see Chapter 2 and Chapter 3), and because sellers can easily abuse the signal in an informal market, where a sellers' friends can pose as buyers, bid a higher price, and increase the price. Hence, informal market sellers that do not have access to technology-driven interfaces should avoid using this signal.

Milking. Consistent with expectations, allowing milking has no impact on the three key outcomes. Milking is a form of product trial, although it is widely manipulated. As mentioned in section 7.1, low-resource sellers are more likely to use this signal, which is associated with fraudulent practices. Buyers in the market are aware of these practices and thus do not have expectations associated with the signal, showing how product trials can lose value when manipulation increases.

Fodder fed. Consistent with expectations, feeding fodder increases perceptions of reliability/credibility for high-resource sellers, although low-resource sellers are likely to abuse this signal (see section 7.1). However, no impact of fodder fed is observed on price unfairness perceptions or price. This can be because sellers increase prices by a huge margin when making small incremental changes, such as feeding fodder, cutting horns, or oiling cows/buffalos (see

Chapter 4, Chapter 5, and Chapter 6). High-resource sellers can do this to gather advantages in negotiations later. As a result, buyers do not attach expectations of price fairness with fodder fed.

While high-resource sellers across all informal market types can use investments in product care, such as expensive packages, to improve perceptions of credibility/reliability, investments in product care may not reduce price unfairness perceptions or increase payoffs if negotiation is carried out. Buyers might believe that sellers are increasing prices unfairly after making small investments in product care.

Product guarantees. As expected, product guarantees do not influence outcomes. As was discussed in Chapter 2 and Chapter 3, chances of consumer moral hazard are high, which requires the intervention of legal authority. Consistent with Boulding and Kirmani (1993)'s findings, as consumer moral hazard increases, product guarantees lose importance. Furthermore, consistent with Moorthy and Srinivasan (1995) and Jain, Slotegraaf, and Lindsey (2007)'s analysis, high transaction costs are created which create negative perceptions about product guarantees. The high transaction costs in turn lower product quality perceptions, consistent with Thaler (1985) and Friestad and Wright (1994)'s analysis. Hence, informal market sellers should not provide product guarantees unless a legal mechanism exists that can transparently implement the warranties.

LPGs. Contrary to expectations, LPGs increase reliability/credibility for high-resource sellers only, although low-resource sellers are more likely to use this signal (see sections 7.1.1 and 7.1.2). Apart from perceptions of lower quality that low-resource sellers carry, the low liquid financial resources of low-resource sellers can also create questions on their ability to fulfill the LPG guarantees. When high-resource sellers use LPGs, reliability/credibility is increased due to feelings of emotional attachment and benevolence. However, no impact on price unfairness perceptions is observed. Hence, high-resource sellers should use LPGs to showcase their social status and financial resources, as was discussed in detail in section 7.1.1 and section 7.1.2

To conclude, high-resource sellers in informal markets can use signals which show investments in product care, wide distribution networks, and financial/emotional attachment through LPGs and consistent locations as part of their positioning strategies and positively influence all three key outcomes. However, low-resource sellers suffer from a lack of reputation and can only use a percentage of the price offered as a signal. Low-resource sellers must eliminate the use of pseudo-signals that low-resource sellers are associated with. Once low-resource sellers have improved their reputation, they can use preannouncements and the percentage of credit offered as signals that can provide benefits across the three key outcomes. Additionally, market intervention is required to improve expectations associated with low-resource sellers, so that chances of buying from low-resource sellers increase. This is discussed in the “managerial implications” section.

7.1.5 Word Of Mouth As The Propagation Medium

Consistent with Connelly et al (2011)'s analysis, the study shows that an unsuitable propagation medium can distort the signaling message. In developed economies, many propagation mediums exist, like the presence of information technology or complex organizational structures that transmit signaling messages as intended by signal senders. The medium of propagation in developed economies is more developed and comparatively clearer due to more sophisticated infrastructure. The wide range of propagation mediums allows sellers to use various signals. However, due to lack of sophisticated infrastructure, absence of complex technology, lack of advanced organizational structures, and reliance on verbal communications, propagation mediums are limited in informal markets. In informal markets, due to the presence of many people and strong social/business interrelationships, word of mouth is the only propagation medium available. This propagation medium allows signals to be sent, observed, and evaluated by signal receivers, creating expectations for signals.

The study contributes by identifying many signals that can be transmitted through word of mouth. Specifically, the study shows that

investments in product care, wide distribution networks, LPGs, consistent locations, and a percentage of credit offered can create positive outcomes in informal markets. Thus, informal market sellers that do not have access to propagation mediums other than word of mouth should use signals identified in this study in creating their optimal signaling strategies. Sellers that have little financial resources will use the percentage of credit as a signal, while sellers with more financial resources will use the remaining signals. For low-value products, like fruits or vegetables, offering a percentage of credit might not be necessary due to lower costs. Instead, low-resource sellers can offer other credit options, such as store credit, so that buyers do not have to pay upfront.

7.1.6 Need For A Clutter-Free Propagation Medium

The study shows that many pseudo-signals prevail in informal markets. The pseudo-signals likely reduce buyer confidence. The study also found that many signals which can be enabled by word of mouth do not function. This shows that the signaling environment cannot transmit information contained within the signals, making it difficult for buyers to observe and create expectations for signals. This has wide-ranging consequences. Investing too much time and money in signals that are not observed by buyers leads to inefficient allocation of time and monetary resources. To overcome challenges to signaling, alternative, clutter-free propagation mediums are needed which allow buyers to easily observe and attach expectations with signals. Such mediums can use telecommunications and the internet. However, as discussed in Chapter 6, only a quarter of buyers and sellers use smartphones, while the majority of buyers and sellers have little education. Lack of technical skills and education make it difficult to introduce more complex propagation mediums.

To successfully introduce new propagation mediums, buyers and sellers must be provided with technical skills, such as using social media or smartphone-based trading platforms. Imparting such skills must be included in informal market-focused developmental programs.

7.1.7 Need For Signal Overlap

The study shows that sellers send signals that buyers do not receive, reducing the impact of signals and wasting time/costs incurred in creating the signals, consistent with Connelly et al (2011)'s analysis. To improve signaling in informal markets, policymakers must ensure that buyers and sellers send, observe, and receive the same signals. This is called signal overlap. This means that sellers must send the same signals that the buyers are looking for, reducing signal waste. Policymakers should identify signals that sellers use and attempt to make these more salient and observable so that buyers can observe these and create quality expectations. For instance, policymakers can create buyer expectations for the signals identified in the present study. This will make it easier for new sellers to identify signals that buyers observe, saving time and costs on non-functioning signals, increasing signal overlap.

7.1.8 Need For Buyer/Seller Educational Programs

The study shows that many signals do not have signaling value in informal markets, due to clutter in the signaling environment or a lack of buyer knowledge of the signals. As mentioned previously, buyers first need to observe a signal and then attribute expectations with signals. Results indicate that buyers are not actively searching for a signal, probably because they do not expect the signal to be associated with quality, consistent with Connelly et al (2011)'s analysis. For instance, buyers might hear a preannouncement but are unable to make connections between preannouncements and quality.

A very important question that arises is, what options do sellers have when buyers are not searching for signals that sellers want to use? It can be possible that a seller wants to introduce new signals in the market, such as third-party certifications in cow/buffalo handling. In this situation, sellers need to educate buyers, so that buyers learn to actively search for signals and associate them with quality. The process of buyer learning and creating expectations for signals will require buyers to interact with the signal over time. The study results indicate that buyers have not created expectations for many signals in the market, rendering them useless, consistent with Akerlof (1970)'s

analysis. To catalyze this process, sellers must communicate the signals so that buyers can repeatedly observe and interact with the signal. Sellers must be patient and adopt alternative signals during the time required for new signals to be associated with quality.

After having discussed the theoretical implications of the study, the managerial implications are discussed next.

7.2 Managerial Implications

7.2.1 Need To Combine Signals

The study shows that signals can influence outcomes differently. For instance, calves attached are shown to increase both PPS and price, but not influence PUP. Due to the poor reputation of low-resource sellers, the percentage of credit offered does not seem to influence PPS, although PUP is lowered. Hence, the impact of signals must be assessed across all outcomes and then signals should be selected. An example of combining signals was demonstrated when optimal signaling strategies were presented for high- and low-resource sellers. Similarly, the study found that signals are associated with different expectations. Most signals in informal markets are associated with seller intentions, such as credibility/reliability and price fairness behavior. On the other hand, only one signal is associated with price.

Although informal markets are heterogeneous, the dynamics of informal markets are quite similar. Hence, sellers across all informal market types need to adopt a multi-pronged strategy to reach desired outcomes and combine investments in product care, LPGs, consistent locations, wide distribution networks, and percentage of credit offered together based on the desired outcome.

7.2.2 Need To Use Non-Signals

The study shows that like signals, non-signals influence outcomes in informal markets. In Chapter 6, it was shown that signals explain about 15% of the variation in results, while the remaining 85% is explained by non-signals. Most importantly, product quality characteristics play the highest role in explaining variation. On the

other hand, relationship variables are extremely important. In informal markets, social relationships, reputation, and interlinked behavior have a huge impact on economic activities, consistent with Viswanathan, Rosa, and Ruth (2010)'s analysis. Sellers in informal markets must ensure that any signaling strategy is complemented with socially responsible behavior.

7.2.3 Need To Leverage Cultural Contradictions

The social culture of informal markets is rife with contradictions, which can influence signals. For instance, buyers in informal markets expect sellers to withhold important information, such as price so that sellers can negotiate later. Similarly, providing competitor product information is seen as amateur and unprofessional. An explanation for these expectations is that power and resource inequalities cause people to engage in less helpful behavior and expect others to conform to these norms, consistent with Jachimowicz et al. (2020)'s analysis (please see Chapter 6). Sellers who provide too much information are violating norms and creating unease.

Similarly, the positive impact of LPGs for high-resource sellers further shows the cultural contradictions of informal markets, since LPGs gain credibility due to the financial resources of high-resource sellers. While high-resource sellers attempt to exclusively concentrate power and financial resources in informal markets, they also aim to avoid unrest or political upheavals, and thus invest in local religious or charitable organizations to create a favorable image but oppose developmental and educational opportunities for the wider population. This contradictory behavior is consistent with Khandan (2017) and Hossain and Moore (2002)'s analysis. To maintain their favorable image, high-resource sellers are willing to honour LPGs with a minimum of delays for the buyers.

Sellers in informal markets must account for these contradictions and should learn the appropriate type and amount of information that buyers expect. Sellers should avoid providing excessive information and should highlight their financial resources.

7.2.4 Potential Market Interventions

To improve signaling in informal markets, an electronic or ICT-based intervention is necessary, along with a new educational program. Both the interventions have different benefits. The intervention should help market participants observe signals and create accurate expectations. Additionally, the study shows that low-resource sellers are perceived to be unfair due to their meagre financial resources. To improve signaling, the stigma associated with low resources must be eliminated. To make signaling fairer for low-resource sellers, buyers must be taught to create positive expectations with signals used by low-resource sellers.

As mentioned previously, creating expectations for signals requires interactions with signals over time, known as the feedback loop. A lot of trial and error is involved in this learning process. An intervention can help create new expectations in short periods and eliminate the need for trial and error. A potential intervention is an electronic intervention, such as an electronic board in a market that provides information about signals that are used by low-resource sellers, such as the percentage of credit offered or times consistent locations are chosen. The intervention can teach buyers new ways to interpret signals, helping improve the signaling process. Furthermore, sellers in informal markets can be physically segmented based on the signals used. For instance, sellers can be allocated different areas in the market based on the type of information preannounced (e.g. price or product attributes). A separate area can be reserved for sellers that visit the market each week. Through these interventions, buyers can repeatedly observe and attach expectations with signals. The interventions can lower purchase risk and improve market efficiency.

On the other hand, educational programs are required that can help sellers decide on better use of signals. As shown by Hossain and Moore (2002) and Khandan (2017), feudal and agricultural landlords concentrate power and financial resources. To avoid unrest and maintain a positive standing in society, they invest in charity and the welfare of the poorer people. However, feudal, and agricultural landlords tend to oppose education or developmental programs that

can reduce inequality. This creates a situation where sellers are unlikely to understand the proper usage of signals. As shown in the data, low-resource sellers – who likely have the least education – are more likely to use pseudo-signals. To help sellers understand how to use signals, educational programs are required. For instance, educational programs can teach sellers how to use the optimum levels of a signal, such as the optimum amount of fodder (results show that low-resource sellers use either very low or very large fodder amounts). Similarly, sellers can be taught how to set prices that allow negotiations but do not create perceptions of overcharging. Sellers can be taught how to showcase their financial resources or create perceptions of benevolence and emotional attachment with buyers. The educational programs will reduce signal wastage by sellers and improve positive outcomes for both buyers and sellers.

In sum, using ICT-based interventions or educational programs can improve signaling in informal markets, leading to reduced buyer purchase risk and improved market efficiency. Next, the limitations of the study and areas of future research are discussed.

7.3 Study Limitations And Future Research

Study limitations. The present study is the first attempt to understand how informal market sellers can simultaneously (1) reduce adverse selection and (2) adopt unique positioning strategies that showcase their unique social positions. The study categorized signals into PR and EB slots. Afterward, the impact of signals on three key outcomes was determined using a field study. During the field study, data on buyers' post-purchase evaluations were not gathered. Due to privacy reasons, researchers were not allowed to gather identifiable information from buyers which can be used to track buyers and ask them about the actual product quality post-transaction. Any future study can address this limitation and gather data on actual post-purchase quality perceptions.

Secondly, the study focused on an informal market where high-investment products are exchanged. Given the heterogeneity of informal markets, data from informal markets where low-investment

products (e.g., fruit/vegetables, clothes, etc.) are exchanged can reveal interesting insights. Thirdly, the data relied on surveys since no alternative data exists. Access to more reliable data, preferably with a lower potential for respondent bias, can provide better results. Fourth, the context of the study was very challenging. The buying/selling was very hectic, and buyers/sellers were unwilling to allocate more time to answer. This situation increases bias in the data. Although adequate steps were taken to address the bias by training researchers to be efficient and by putting important questions upfront, bias can still exist. To resolve this, future studies should find ways to gather data when buyers/sellers are more relaxed, and chances of responder mistakes are less.

Fifth, the study faced challenges in gathering financial data of buyers/sellers. The buyers/sellers were suspicious of the research motives and believed the research can be used for taxation. Since buyers/sellers evade taxes and distrust the government - a trait of informal markets – they were unwilling to provide financial information. Although the study did overcome these challenges, future studies can find more objective ways of gathering financial data. Sixth, the study attempted to gather data on the usage of all signals. Since the study was the first attempt and was designed to explore signal usage, the study had to gather data on all signals, rather than gathering detailed data on a few signals. For instance, detailed data on LPGs can show the period for which the LPG is valid or whether the presence of a seller-imposed penalty influences an LPG's credibility or not (please see Chapter 2). Additionally, detailed data can explore whether the duration of offering a percentage of credit impacts feelings of seller credibility/reliability or not.

Lastly, future studies can collect data for longer periods. The present study collected data over 3 months. Seasonality may influence signal usage. For instance, since many low-resource sellers must work outside the cattle markets and then engage in trading once they save money, low-resource sellers may flood the informal markets in some months. When the numbers of low-resource market sellers increase, signals used by low-resource sellers can become more noticeable and can affect buyers' evaluations. The present study showed that low-

resource sellers have a lesser likelihood of using many signals, such as preannouncements or product guarantees. When the number of low-resource sellers increases, variations in signal usage can also increase (e.g., use of product guarantees can increase), influencing signal outcomes. A future study should determine the impact of seasonality and the number of low-resource sellers in influencing the use of signals and in influencing the three key outcomes.

Future Research. While the study shows how informal market sellers can use signals to (1) reduce adverse selection and (2) create positioning strategies that showcase their social positions, further research is critical. Specifically, an understanding is required of (1) the process through which sellers use signals to position themselves and reduce adverse selection and (2) the outcomes of adopting positioning strategies and reducing adverse selection. Table 7.4 presents a summary of these two key study areas and their important sub-topics, elaborated on below.

Table 7.4: Key Areas for Future Research

	<i>Focus area</i>	<i>Key question</i>	<i>Study challenges</i>	<i>Key benefit</i>
<i>Processes</i>	How do buyers learn of sellers' positioning signals?	How can sellers teach buyers to evaluate new signals?	Identify potential interventions to promote buyer learning.	Can help identify new means through which buyers can be taught new signals.
	How do sellers guard distinct positioning strategies?	Can sellers of different resource levels combine PR and EB signals?	Measure all signals that sellers with different resource levels use.	Understand if sellers with different resource levels can use the same signals with cut-off values.
	Can sellers use alternative propagation mediums to signal?	Can the signals apply through some unstudied propagation mediums?	Measure all signals used and explore propagation mediums for each signal.	New propagation mediums might be identified that have been previously overlooked.
<i>Outcomes</i>	How should a seller choose an optimal number of signals for positioning?	How many signals must a seller use?	Measure payoffs from using various signal combinations.	Can help identify the optimal number of signals to use and avoid signal wastage.

How do financial or pro-social positioning strategies impact sellers?	Are social resources as <i>effective</i> as financial resources?	Measure costs and payoffs of signals that use financial and pro-social resources.	Understand the impact of various signal types in creating temporary or enduring disadvantages (e.g., total vs temporary social isolation)
Does word of mouth drive deceptive sellers out of the market?	Does negative word of mouth force sellers to leave the market?	Measure the relationship between word of mouth and seller time in the market.	Understand the impact of word of mouth in sustaining signals.
Can sellers hamper the spread of negative word of mouth?	How can sellers stop negative word of mouth?	Measure relationship between (1) diversification strategies and (2) consumer moral hazard with word of mouth.	Understand potential limitations of word of mouth in sustaining signals.

7.3.1 Processes

To formulate effective and distinct positioning strategies while reducing adverse selection, understanding how buyers learn of sellers' positioning signals is crucial.

How do buyers learn of sellers' positioning signals? Since sellers communicate their distinct positions through signals, understanding how buyers become aware of signals is necessary. Is it necessary that buyers must rationally evaluate a signals' message or just associate a signal with quality over time? What options do sellers have if buyers do not observe a signal? Must the sellers adopt a new positioning if buyers do not observe the signals? If the sellers want to use a signal to adopt a unique position compared to the competitors – such as using a costly third-party certification that communicates skill intensiveness - sellers can teach buyers to create expectations with a signal. However, this requires the buyer to observe the signal over time (Akerlof 1970), which requires repeated seller efforts to make the signal visible. Empirical validation is required to identify the best ways to promote buyer learning.

How do sellers guard distinct positioning strategies? In the study, results show that low-resource and high-resource sellers will

use mutually exclusive signals (i.e., PR/EB signals) as part of their positioning strategies, although high-resource sellers do use certain EB signals. However, what happens if low-resource sellers mimic high-resource sellers? Is it possible that high-resource sellers will adopt new signals? It is possible that within PR signals at lower values, high-resource sellers are indifferent to mimicry attempts by low-resource sellers. For instance, a cutoff value can exist for feeding fodder, as was shown in the present study. If low-resource sellers feed fodder below this cutoff value, high-resource sellers do not perceive a threat to their unique positioning strategies. However, do such cut-off values exist for other signals, such as the extent of a distribution network or the extent of refund offered in LPGs? Empirical validation is required to determine cutoff values for PR and EB signals.

Can sellers use alternative propagation mediums to signal? Although the present study shows that word of mouth is the primary propagation medium for informal markets, empirical validation of the utility of all propagation mediums is required (including those that are believed to be inapplicable). Sellers might use signals through alternative propagation mediums that are not theorized. Learning about alternative propagation mediums can allow sellers to use more signals and thus expand possibilities of adopting different positioning strategies, improving the competitive dynamics of informal markets. To shed more light on the role of propagation mediums, classifications are required that identify technical parameters on which to evaluate the propagation mediums (e.g., number of product features communicated), which are then tested in an empirical setting.

7.3.2 Outcomes

To formulate effective and distinct positioning strategies while reducing adverse selection, it is important to determine the number of signals that buyers can process, and how various signal types influence positioning strategies.

How should a seller choose the optimal number of signals for positioning? If a seller uses too many signals in a positioning strategy, it might confound the buyers. Furthermore, using too many

signals increases both time and financial costs, which can hurt seller profits. To help sellers signal more cost-effectively, empirical validation is required to determine the optimal number of signals that a seller should use. Given the highly price-sensitive nature of consumers in informal markets, the number of quality-sensitive buyers is likely to be lower than in typical markets in developed economies, leading to lesser payoffs when using only costly signals. In creating the optimal signal combination, only those signals should be used that buyers expect to observe and attach quality associations with, helping reduce signal wastage and promoting signal overlap (Connelly et al 2011). Studies must identify signal combinations that create the greatest consistency between sellers' social position and market expectations and that offer the highest payoffs per cost. For instance, using signals that require no upfront costs, like preannouncements or LPGs, might be consistent with a low resource sellers' social position and might generate higher profits compared to using the percentage of credit as a signal. Finding an ideal combination might eliminate the need to use some signals that are identified in the present study, saving signaling costs.

How do financial or pro-social positioning strategies impact sellers? While the present study shows that sellers with different resource levels will use either financial or pro-social signals to position themselves, further research is needed to understand which of the two positioning strategies creates long-lasting consequences for sellers. Although the study posits that low-resource sellers are at a disadvantage due to their chance of social isolation if product quality is lower than expected, it is possible that adopting a pro-social positioning strategy can reverse the consequences of social isolation when low-resource sellers remind community members of past sacrifices that they made. This might even lead community members to engage in future purchases with low-resource sellers. However, since high-resource sellers cannot offer examples of sacrifice, buyers might not be willing to engage in future purchases with high-resource sellers.

Does word of mouth drive deceptive sellers out of the market? Although the present study theorized that word of mouth

sustains signals in informal markets, empirical validation is required to determine the impact of negative word of mouth. It is possible that despite gathering negative word of mouth, sellers with lower-than-expected quality do not relocate or leave the market, possibly due to the high costs of relocating given limited incomes. Such sellers might continue to operate and trade with new unsuspecting buyers that come to informal markets, creating potential losses for new buyers. An empirical study must establish a relationship between word of mouth and the time a seller spends in informal markets. If a negative relationship is established, it can be concluded that sellers with negative word of mouth change markets frequently, lending support to word of mouth in sustaining signals in informal markets.

Can sellers hamper the spread of negative word of mouth?

Although word of mouth can create negative consequences, sellers can use various strategies to avoid any negative consequences if product quality is lower than expected. For instance, diversifying through selling in geographically dispersed markets or having a broad product line creates difficulty in damaging every aspect of a sellers' business, reducing the impact of negative word of mouth (Rao, Qu, and Ruekert 1999). Additionally, sellers can create perceptions of consumer moral hazard to inhibit negative word of mouth, such as when a more experienced seller can shift product malfunction blame onto a novice buyer (e.g., when an expensive cow requires special care), even if the seller offered lower-than-expected quality. Empirical validation is required to determine how the extent of diversification (e.g., selling fruits/vegetables or different cow/buffalo breeds together), selling in geographically dispersed markets (e.g., selling in different commodity markets), and differences in buyer/seller product proficiency influence word of mouth. Insights to these questions can uncover the limitations of word of mouth in sustaining signals.

7.4 Conclusion

Informal markets suffer from adverse selection, which if left unchecked, can lead to market failure. This problem is further compounded by the lack of institutions in informal markets that address adverse selection, and the power and resource inequalities of

informal markets that create disadvantages for sellers. Considering the challenges that disadvantaged sellers face in informal markets, helping disadvantaged sellers overcome these challenges will not only improve the welfare of such sellers but also improve market efficiency. The study identifies three key obstacles that informal market sellers need to overcome to prosper and survive - increasing credibility/reliability, decreasing price unfairness perceptions, and increasing price. Successfully achieving the three outcomes lowers adverse selection and buyer risk, while increasing seller profits. To understand how informal markets might resolve adverse selection, a novel framework is presented which is enabled by word of mouth as the propagation medium. The novel framework identifies signals that high-resource sellers will use to showcase their power and financial strength (i.e., PR signals) and signals that low-resource sellers will use to showcase their emotional attachment with buyers (i.e. EB signals).

Data was collected from a cattle market in Pakistan. Many signals were discovered that do not exist in the literature, such as milking allowed, calves attached, and auction method to state price. However, due to ease of manipulation to send false information, these signals were categorized as pseudo-signals. Additionally, many signals theorized to be infeasible in informal markets - such as product guarantees and providing competitor quality information – were being used by sellers.

Results showed that many signals impact PPS and PUP but only one signal impacts price. Price is influenced mostly by product (i.e., cow/buffalo) quality characteristics. Furthermore, signals seem to impact the three outcomes differently: a signal can positively influence one outcome but have no impact or a negative impact on another outcome. To extract the greatest benefit from signaling, signals must be optimally combined to maximize benefits and minimize disadvantages.

Results show that low-resource sellers suffer poor reputations in informal markets, reducing the credibility of EB signals used. Low-resource sellers can only use the percentage of credit offered to reduce price unfairness perceptions, although other benefits of the

signal, such as increasing price or increasing seller credibility/reliability are not observed. As part of the optimal signaling strategy, low-resource sellers should increase the percentage of credit and reduce the use of pseudo-signals that are associated with low-resource sellers, such as feeding extreme fodder amounts, attaching calves, and allowing milking. Reducing the use of pseudo-signals will help low-resource sellers improve reputation and make other EB signals (e.g., percentage of credit, preannouncements) more credible, allowing low-resource sellers to extract full benefits of these signals.

On the other hand, high-resource sellers have an advantaged position in informal markets. All PR signals bring positive benefits to high-resource sellers, as well as several EB signals, such as choosing consistent locations and offering LPGs. Thus, high-resource sellers can exclusively use all the PR signals and some EB signals to showcase their financial resources and power in society, maintaining a unique social position in informal markets. The results also demonstrate the need to make selling in informal markets fairer for low-resource sellers, by reducing negative associations that buyers have with low resources.

The study makes many contributions to theory and practice. The study shows that high-resource informal market sellers can use PR signals exclusively, such as investments in product care and wide distribution networks, as part of their positioning strategies. Additionally, high-resource sellers can use certain EB signals in their positioning strategies, such as consistent locations and LPGs. On the other hand, low-resource sellers should use the percentage of credit as a signal and work to improve their reputation, so that they can fully benefit from all EB signals. The study ends by identifying the limitations of the existing research, identifying areas for future research, and presenting potential interventions that can overcome the disadvantages faced by informal market sellers.

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Appendix

Appendix 1

Table 1. Questions related to signals from survey instrument.

Note: Questions on non-signals were derived from De Mel, McKenzie and Woodruff (2014). Questions on “confidence in sellers” were derived from Erdem and Swait (2007), while all other signaling questions were created for the study to ensure simplicity. See section 5.4

Seller survey	Buyer survey
Price informing behaviour	
<ul style="list-style-type: none"> How do you inform the seller of price: directly or by auction method? 	<ul style="list-style-type: none"> How did the seller inform you of the price?
Buyer seller relationship	
	<ul style="list-style-type: none"> How many times have you bought from this seller before?
Referrals	
	<ul style="list-style-type: none"> How many people do you know who have bought from this seller? How many recommended the seller?
Consistent selling locations of seller	
<ul style="list-style-type: none"> Near which shed or inside which shed in the market did you put your animals today? Did you visit the cattle market last week? Did you put your animals in the same places last week as you have put them today? Do you try to choose the same location every time you visit the cattle market? In the last 1 month, how many times did you come to the market? In the last 1 month, how many times did you try to choose the same location to sell your animals in the cattle market”? In the last 1 month, how many times did you get the same location for your animals in the cattle market? 	<ul style="list-style-type: none"> In the last 1 month, how many times did you come to this cattle market? In the last 1 month, how many times did you meet the seller at this cattle market? In the last 1 month, how many times did you meet the seller at the same shed or location where you met today? Do you always meet this seller in the same shed or location?
Slotting allowances	
<ul style="list-style-type: none"> To put the animals in your location of choice, how much money did you happily pay to the management today? 	

Competitor price/quality information

- Do you tell your buyers about the prices of other sellers when people come to buy from you in the cattle market?
- Do you tell your buyers about the quality of animals of other sellers when people come to buy from you in the cattle market?
- Did the seller provide you any information on the selling prices of other sellers at the time of the transaction?
- Were the prices of this seller higher or lower than the prices of other sellers in the market?
- Did the seller provide you any information on the animal quality of other sellers at the time of the transaction?
- Was the quality of this seller higher or lower than the quality of other sellers in the market?
- What information about other seller's animal quality did the seller give you at the time of the transaction?

Preannouncement behaviour

- In general, how many days before bringing the animal to the market do you tell the customer?
- In general, do you tell the customers in advance about the price of the animals that you bring to the cattle market?
- In general, do you tell the customers in advance about the product quality of the animals that you bring to the cattle market?
- How many days in advance did the seller tell you in advance the date that He was going to bring the animal to the market?
- About the animals that you saw today, did the seller tell you in advance the price on which He was going to sell the animal in the market?
- What is the difference between the present price of the animals and the price told in advance by the seller?
- About the animals that you saw today, did the seller provide you any information on the product quality of the animals in advance?
- What information about the animal quality did the seller give you in advance?
- What is the difference between the present quality of the animals and the quality told in advance by the seller?
- Did you in the past buy an animal from the seller about which he gave information in advance?
- Was this information accurate?

Product guarantees

- Do you offer product guarantees for the animals that you sell in the cattle market?
- Has the seller today offered you any guarantee for returning the animals if the quality is bad?

- In the last month, how many customers claimed the guarantees?
- In the last month, how many guarantees did you fulfil?
- Did the seller offer any product warranties in the past?
- How many times did you claim product warranties in the past?
- How many times did the seller fulfil product warranties in the past?

Low price guarantees

- Do you offer price guarantees in the cattle market so that if the customer finds a lower price in the market for the type of animal that you sold, you return the extra money you charged for the animal?
- In the last month, how many customers claimed the price guarantees?
- In the last month, how many price guarantees did you fulfil?
- Did the seller offer any Low-price guarantees so that if you find a lower price for the animal in the market, the seller will pay you the difference between the selling price and the lowest available market?
- How many times did you claim the low-price guarantee in the past?
- How many times did the seller fulfil the low-price guarantee in the past?

Permission to milk animals

- On average, how many times do you allow a buyer to milk the animal that He wants to buy in the cattle market?
- How many times on average did the seller allow you to milk the animals today to check their quality?

Amount of fodder being fed

- Overall, how much fodder was the seller feeding to his animals?

Certifications

- Do you have any certification from any authority in handling cows and buffalos?
- Did the seller show you any certificate from breeder associations or any other body which shows that the seller is trained to handle cows and buffalos”?
- Certification name and details
- What was the certification's name?

Services of commission agents

- Do you use the services of commission agents to connect with the buyers in the cattle market?
- Did a commission agent connect you with the seller?
- How much commission do these agents charge?
- How much commission did the commission agent take?

Amount of payment offered for credit

- Today How much % of the total cost of animals that you bought or wanted to buy did the seller allow you to pay later?

Confidence in the seller

- “I'd have to try this seller several times to figure out

what the quality of the seller is”

1=strongly agree 2=agree
3=neither agree nor disagree
4=disagree 5=strongly disagree

- “I never know how good this seller will be before I buy it.”

1=strongly agree 2=agree
3=neither agree nor disagree
4=disagree 5=strongly disagree

Controls	
Age	
• What is your age?	• What is your age?
Education	
• Uptil what class have you received an education?	• Uptil what class have you received an education?
Buying/selling experience	
• Since how many years are you selling animals?	• Since how many years have you been buying animals?
Areas of residence	
• Where do you live?	• Where do you live?
Languages spoken	
• What languages can you speak well with others?	• What languages can you speak well with others?
Business backgrounds	
• How many businesses in other sectors do you have?	• How many businesses in other sectors do you have?
Number of cattle markets visited	
• How many other cattle markets do you go to each week?	• How many other cattle markets do you go to each week?
Family members/non-family members paid as helpers	
• On average, how many paid family members and relative people do you bring in the cattle market as helpers for you?	• On average, how many paid family members and relative people do you bring in the cattle market as helpers for you?
• On average, how many paid non-family members and non-relative people do you bring in the cattle market as helpers for you?	• On average, how many paid non-family members and non-relative people do you bring in the cattle market as helpers for you?
Seasons of doing business	
• In which months of the year do you sell animals?	• In which months of the year do you buy animals?
Business practices	
• How do you keep a record of your expenses and revenues?	
• In the last three months, have you visited one of your competitor’s businesses to see what prices they are charging?”	

- In the last three months, have you visited one of your competitor's businesses to see what products they have available for sale?
- In the last three months, have you asked your existing customers whether there are any other products they would like you to sell or produce?
- In the last three months, have you asked a supplier of animals about which products are selling well in the cattle sector?
- In the last three months, have you used a special offer to attract customers?
- In the last three months have you attempted to negotiate with a supplier for a lower price on animals you buy or fodder you feed to the animals?
- In the last three months, have you compared the prices or quality of animals or animal fodder offered by alternate suppliers with the supplier you have?
- How frequently do you run out of stock of animals or fodder?

Financial record-keeping

- Do you have a record-keeping system that allows you to know how much stock of animals or fodder you have on hand?
- Do you keep written business records?
- Do you regularly use your records to know whether sales of a particular animal are increasing or decreasing from one month to another?
- Have you worked out the cost to you of each animal you sell?
- Do you know which animal types make you the most profit per item in selling?

Smartphone usage

- | | |
|---|---|
| <ul style="list-style-type: none"> • Do you have a smartphone? | <ul style="list-style-type: none"> • Do you have a smartphone? |
|---|---|

Attitudes

- | | |
|---|---|
| <ul style="list-style-type: none"> • Are you always optimistic about your future? • Can A person can get rich by taking risks? • Is it important for you to do something only if it is popular with people around you? | <ul style="list-style-type: none"> • Are you always optimistic about your future? • Can A person can get rich by taking risks? • Is it important for you to do something only if it is popular with people around you? |
|---|---|

- | | |
|---|---|
| <ul style="list-style-type: none"> • When a group you belong to plans an activity, would you rather direct it yourself than just help out? • Is it important for you to perform better than others on a task? • Do you rarely count on good things happening to you? • Do you enjoy planning things and deciding what other people should do? • Do the most important things that happen in life involve work? • Will your family and friends would say that you are a very organized person? | <ul style="list-style-type: none"> • When a group you belong to plans an activity, would you rather direct it yourself than just help out? • Is it important for you to perform better than others on a task? • Do you rarely count on good things happening to you? • Do you enjoy planning things and deciding what other people should do? • Do the most important things that happen in life involve work? • Will your family and friends would say that you are a very organized person? |
|---|---|

Risk-taking behaviour

- | | |
|--|--|
| <ul style="list-style-type: none"> • Willingness to take risks:
In general <p>0= "I always try to avoid taking risk"
10= "I am fully prepared to take risks"</p> | <ul style="list-style-type: none"> • Willingness to take risks:
In general <p>0= "I always try to avoid taking risk"
10= "I am fully prepared to take risks"</p> |
| <ul style="list-style-type: none"> • Willingness to take risks:
With your health <p>0= "I always try to avoid taking risk"
10= "I am fully prepared to take risks"</p> | <ul style="list-style-type: none"> • Willingness to take risks:
With your health <p>0= "I always try to avoid taking risk"
10= "I am fully prepared to take risks"</p> |
| <ul style="list-style-type: none"> • Willingness to take risks:
In making investments <p>0= "I always try to avoid taking risk"
10= "I am fully prepared to take risks"</p> | <ul style="list-style-type: none"> • Willingness to take risks:
In making investments <p>0= "I always try to avoid taking risk"
10= "I am fully prepared to take risks"</p> |
| | <ul style="list-style-type: none"> • Willingness to take risks:
In making investments <p>0= "I always try to avoid taking risk"
10= "I am fully prepared to take risks"</p> |

Trust perceptions

- | | |
|--|--|
| <ul style="list-style-type: none"> • Would you say that most people can be trusted or that you need to be very careful in dealing with people? • I'd like to ask you how much you trust your neighbors? • I'd like to ask you how much you trust people you meet for the first time? • How much confidence do you have in the press? • How much confidence do you have in the police? • How much confidence do you have in the courts? | <ul style="list-style-type: none"> • Would you say that most people can be trusted or that you need to be very careful in dealing with people? • I'd like to ask you how much you trust your neighbors? • I'd like to ask you how much you trust people you meet for the first time? • How much confidence do you have in the press? • How much confidence do you have in the police? • How much confidence do you have in the courts? |
|--|--|

- | | |
|---|---|
| <ul style="list-style-type: none"> • How much confidence do you have in the national government? • How much confidence do you have in the district government? • How much confidence do you have in town management? | <ul style="list-style-type: none"> • How much confidence do you have in the national government? • How much confidence do you have in the district government? • How much confidence do you have in town management? |
|---|---|

Cognitive abilities

- | | |
|--|--|
| <ul style="list-style-type: none"> • A bat and a ball cost rupee 110 in total. The bat costs rupees 100 more than the ball. How much does the ball cost? • If it takes 5 machines 5 minutes to make 5 buttons, how long would it take 100 machines to make 100 buttons? • In a lake, there is a patch of Roses. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? | <ul style="list-style-type: none"> • A bat and a ball cost rupee 110 in total. The bat costs rupees 100 more than the ball. How much does the ball cost? • If it takes 5 machines 5 minutes to make 5 buttons, how long would it take 100 machines to make 100 buttons? • In a lake, there is a patch of Roses. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? |
|--|--|

Digit span recall

- | | |
|---|---|
| <ul style="list-style-type: none"> • Digit span recall score | <ul style="list-style-type: none"> • Digit span recall score |
|---|---|

Ethnicity

- | | |
|--|--|
| <ul style="list-style-type: none"> • What is your zaat? | <ul style="list-style-type: none"> • What is your zaat? |
|--|--|