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Exploiting the Unbanked: Evidence from Singapore's Unlicensed Moneylending Market

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ABSTRACT

Exploiting the Unbanked: Evidence from Singapore's Unlicensed Moneylending Market*

Using a unique dataset covering the borrowing behaviour of over a thousand borrowers, we study the unlicensed moneylending market in Singapore. In this market, borrowers search for lenders, and lenders decide how much profit to extract from borrowers. Lenders harass borrowers into compliance. We observe that different lenders apply different markups on different borrowers. Higher markups discourage borrowers from repeatedly borrowing from a particular lender. Increased enforcement specifically targeted at reducing the number of lenders in this market will increase markups, but will not deter borrowers from becoming recurrent borrowers because they have fewer lenders to choose from.

JEL Classification: K42

Keywords: illegal lending, enforcement, markup

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1 Introduction

Illegal moneylending markets thrive in both developed and developing countries, serving "unbanked"individuals who do not have enough financial resources or credit profile to access the formal banking system. According to Chaia *et al.* (2010), there are more than two billion adults worldwide who are defined as "unbanked". FDIC Audit Report (2006) shows that borrowers lose more than $25 billion annually due to predatory practices. Meikle (2014) conservatively estimates around US$1 billion is paid to unlicensed moneylenders a year in the UK. Among emerging economies, the size of underground lending is estimated to be $780 billion[1] in China, $471 billion in Indian and $172 billion in Thailand (Prabha and Ratnatunga, 2014). According to Kok (2001), unofficial figures by the Singapore Association of Underground Bankers show that unlicensed moneylending amounts to some 9% of the total GDP. Despite the vast size of these underground markets, their inner workings and how effective enforcement activities are in curbing them remain open questions. To the best of our knowledge, we are the first to analyse inner workings of an illegal moneylending market and assess how changes in regulation affect the activities in this underground economy.

We track 1,090 unbanked borrowers in Singapore's unlicensed moneylending market from 2009 to 2016, covering 11,032 loan transactions. All these borrowers were rejected by formal financial institutions, with the majority not meeting the minimum income requirements for legal loans and a minority possessing too many unpaid outstanding loans to qualify for additional borrowings. Government policies targeting the unlicensed moneylending market were also implemented gradually during the same time period, which encompassed a series of acts that elevated penalties for unlicensed moneylenders. These policies increased the unlicensed moneylenders' likelihood of being arrested, as well as discouraged borrowers' participation in this market. This set of policy changes provides a natural environment for us to examine impact of regulatory changes on the unlicensed moneylending market.

A salient feature of this market is that borrowers who borrow a small sum can end up accumulating an unexpectedly high amount of debt payable to the unlicensed moneylenders. The reason for this unexpectedly high amount of debt is in large part due to the lenders' unscrupulous method of extorting money from borrowers(Collard *et al.*, 2006; FDIC Audit Report, 2006). Our data reveals that even the borrowers who repaid installments on time ended up paying an additional 20-80% of interest to the lenders. For the purposes of this paper, we use the term markup to refer to the extra amount of interest the lenders deceptively extract from the borrowers. More clearly, in this paper, markup is defined as the ratio between the amount of money a borrower paid above the principal and interest that the borrower and lender initially agreed upon.[2] This markup can be deemed as the actual cost of the loan to a borrower, net of the interest rate mutually agreed at outset. We use these two terms interchangeably throughout the paper. Admittedly, borrowers in this market have low repayment ability, hence defaulting will naturally contribute

[1] That amounts to 9% of GDP in China. Underground lending is part of the shadow banking industry in China, which amounts to about 47% of China's GDP.

[2] See the definition of markup in Equation 1 on Page 18.

to a high markup. However, this definition of markup adequately captures the additional charges lenders unilaterally impose on borrowers because of the existence of information asymmetry in this market. That is, borrowers in this market are only informed about the agreed interest rate of the loan at the time the loan is disbursed, and do not know the real cost of the loan, as lenders are ambiguous about the mechanisms through which late fees and penalty interest are calculated. This fact is confirmed through our interviews with market insiders and police officers in Singapore, and is also documented in Collard *et al.* (2006). FDIC Audit Report (2006) also provides a detailed description of the predatory behavior of unlicensed moneylenders in the US.

The objective of this paper is to understand how loan markups vary across lenders, how markups relate to repeat borrowings and how government enforcement impacts these factors as well as the relationships between lenders and borrowers in a market with information asymmetry. We apply the search models from Burdett and Mortensen (1998) and Galenianos *et al.* (2012) to describe the interactions between borrowers and lenders in the unlicensed moneylending market. In the model, borrowers search for lenders to obtain loans. After disbursing a loan to a borrower, each lender unilaterally decides how much markup (i.e., late fee, penalty interest) to impose on the borrower. With the presence of search frictions and information asymmetry, borrowers make trade-offs between borrowing from lenders whose markup levels are known from previous transactions, and borrowing from new lenders whose markup levels are unknown. On the other hand, lenders make trade-offs between the profit from a single loan transaction and the future profit each can secure from retaining recurrent borrowers. In equilibrium, the market exhibits a dispersion of markups. Lower markup levels facilitate the formation of long-run relationships between borrowers and lenders. However, when lenders became scarce, lenders may increase markup relative to previous periods.

Our empirical exercise confirms the model's predictions and renders the following insights: First, high markup and harassment are commonplace in this market. Different lenders choose to charge different levels of markup. The distribution of the average markup by lenders is widely dispersed with some lenders clustering at a very high level. Second, a lender's markup level is a key factor a borrower considers when deciding whether to repeatedly borrow from the lender. Borrowers are less likely to become repeat customers of the lenders who charge high markup. Third, intensive enforcement that took place during 2010-2013 greatly impacted the unlicensed moneylending market. The market reached a new market equilibrium in 2014 due to a lagged response to these enforcement activities. Specifically, lenders responded to heightened enforcement efforts by issuing smaller loans and demanding even higher interest rates. Borrowers, in turn, became less likely to repay the loan on time and in full. Both public arrest records and our data confirm that the number of lenders shrank significantly as enforcement was rolled out, which increased search frictions that made it more difficult for borrowers to locate lenders. Lender's fixed effects and OLS estimates show that markups increased by a magnitude of 60-80% after enforcement. In addition, ordered-logit regression results indicate that lenders moderately decreased harassment levels both in terms of severity and frequency from 2010 to 2013 as compared to 2009, but the severity of harassment bounced back

again from 2014 to 2016. A reduction in the number of lenders reduced the impact that the lenders' markup levels had on the borrowers' decision to repeatedly borrow from a particular lender. In other words, after enforcement, an equally high level of markup was less likely to deter borrowers from staying with the same borrower.

Our study on Singapore's unlicensed moneylending market has far-reaching implications from a policy-making perspective. First, unlike most of the existing work on the unlicensed moneylending market, our paper is based on quantitative evidence, hence providing more robust basis for policy analysis. Second, the unlicensed moneylending market in Singapore operates in a very similar way to unlicensed moneylending markets in other countries, implying that insights from our study could have an application to a much broader audience.[3] Third, there is large body of literature devoted to studying the mainstream personal loan and credit card market, as well as the sub-prime markets such as payday loans market and authorised moneylending market. Insights learnt from these markets are not directly useful in understanding the unlicensed moneylending markets, because illegal moneylending differs fundamentally from these legal financing options as there is no underwriting conducted. Hence, our study also contributes by bringing insights to this understudied field of personal finance.

The remainder of this paper is organised as follows. Section 2 offers an overview of Singapore's unlicensed moneylending market and the Singaporean authorities' enforcement strategies. After a brief literature review in Section 3, we describe the theoretical model and predictions in Section 4. A description of the data is in Section 5. Section 6 presents empirical findings and we conclude in Section 7.

2 Singapore's Unlicensed Moneylending Market

In this section, we provide a description of Singapore's unlicensed moneylending market as well as the enforcement activities conducted in recent years.[4] Our fundamental knowledge of the market is generated through ground interviews. The key facts presented here are further verified and substantiated using hard evidence such police reports, court cases, reports by government agencies, parliamentary speeches, as well as research reports.

2.1 Institutional Background

In Singapore's unlicensed moneylending market, lenders act as independent entrepreneurs, whereas borrowers are individuals who are desperate for money but who cannot secure loans from formal institutions. Most borrowers belong to the middle class and below. Many of them borrow money to gamble.[5] Other reasons

[3]Refer to Supplementary Appendix Section A.7 for more information about broader geographic similarities between unlicensed moneylending markets in Asian countries.

[4]Owing to space limitations, we relegate additional background information about Singapore's unlicensed moneylending market to Supplementary Appendix Section A.1.

[5]The Ministry of Community Development (2008) estimates that more than 50% of Singaporeans gamble. In addition, Tan (2014) claims that 58% of Singaporean residents aged 18 and above have participated in at least one form of gambling activities in 2005. This figure dropped

include drug and alcohol abuse, but need-based borrowing is not prevalent. The demand for loans is so robust that lenders do not need to compete with each other (High Court Case, 2012a). According to Toh (2009), a former lender claimed that even if four out of ten clients default, lenders can still profit. In a parliamentary speech, Ho (2010) states that "the loan shark scourge persists because loan sharks enjoy good profits. They charge exorbitant interest rates and recycle their ill gotten gains to fund more loans, thereby accruing even more profits. It is a vicious cycle."

As Ho (2016) has documented, lenders offer quick and convenient short-term loans disbursed in small amounts such as S$500, repayable over four to six weeks on average. Unlike the formal financial sector, Carina (2018) claims that lenders usually do not require collateral or financial statements that prove credit worthiness. Owing to the higher implied risk, illegal loans charge much higher interest rates than legal loans. The interest rate for legal loans disbursed by licensed moneylenders is capped by 4% per month, while illegal loans issued by unlicensed moneylenders can cost 20% to 50% for a six-week term.

The typical process of taking out a loan is as follows.[6] The lender, typically male, will usually be in a coffee shop, accompanied by several individuals. The borrower comes and asks for a loan. Besides enquiring about loan terms, the borrower will often ask for concessions such as waived late repayment fees and a grace period of a few days to catch up on repayments because he/she knows that he/she may fail to make repayments on time. The lender will agree to everything the borrower asks for when it comes to late penalties because the lender has no intention of keeping his promise, as explained to us by an ex-unlicensed moneylender. Once the lender has agreed to give out the loan, the lender does a basic background check which can include making copies of the borrower's identification documents and calling to ensure the telephone numbers provided are valid. The lender then hands out the cash to the borrower and reminds the borrower that the principal and interest must be repaid over a six-week period. This concludes disbursement the loan.

Illegal moneylending markets across the countries share a salient feature that there is information asymmetry on loan terms and illegal lenders extract proceeds from borrowers by manipulating the terms. Given most borrowers are not well off and that the terms of repayment for the loans are exorbitant, it is not surprising that some borrowers cannot make some of the installment payments on time. If this happens, the lender will unilaterally determine a financial penalty and instruct the borrower to pay.[7] Even if the borrower makes all the payments on time, the lender may still cheat the borrower by claiming that certain payments were not made. Despite any evidence proving otherwise, the lender would insist that the borrower is at fault and must pay a penalty (The New Paper, 2008). Often, this penalty involves repaying the entire loan from scratch. In either case, should the borrower try to negotiate, the lender will cut all conversation short and send runners to make

to 47% in 2011 as reported by the Ministry of Community Development (2015). Refer to Supplementary Appendix Section A.3 for the link between a borrower's gambling habit and unlicensed moneylending.

[6]Refer to Supplementary Appendix Section A.2 for more information on how borrowers locate unlicensed moneylenders.

[7]See Supplementary Appendix Section A.6 for an interview with a Singapore Police Officer.

physical and verbal threats until the borrower pays. Chong (2015) claims that these runners typically start with sending reminder notes and calls. If necessary, they harass the borrower, such as by splashing red paint on the borrower's front door (High Court Case, 2013a), harassing the borrower's neighbours and family by pressuring them to ask the borrower to comply (High Court Case, 2011a), locking the borrower's main gate (High Court Case, 2012b) and arson (High Court Case, 2014).

We interviewed five unlicensed moneylenders regarding the lack of adherence to the verbal terms of the loans. They shared an interesting insight: Before disbursing the loan to the borrower, the lender already has a predetermined amount of money that he wants to obtain from the borrower regardless of the situation. According to one former lender, "Whether or not the borrower pays on time is irrelevant. We will take what we want, because we know the weakness of the borrower. I will just ignore whatever promises I have made to the borrower during the negotiation stage." To lenders, it is common knowledge that borrowers have poor credit history and have been rejected by formal institutions. However, unlike formal sector firms, lenders know that borrowers have assets that lenders could profit from via harassment. For example, lenders know that a borrower could beg his parents for money if lenders threaten to hurt the borrower's family or harass the borrower's employer which could cause him to lose his job. The exploitative behavior of lenders is also well documented in FDIC Audit Report (2006)[8] and a policy report conducted by the Personal Finance Research Centre at Bristol University (Collard *et al.*, 2006)[9].

As a result, the interest rate at the negotiation stage is merely the interest rate that both a borrower and a lender verbally agreed to when the loan is initially disbursed. The actual interest paid could be much higher. As documented in Lian He Evening Post (2015), a Singaporean man borrowed S$700 from unlicensed moneylenders, but ended up owing S$13,000. Payday loan lenders in the U.S. deceptively set up loan terms which allow them to extract some 652% APR for two-week loans (Kolber and Morgan, 2014). The unlicensed moneylending market in Singapore is similar. A typical loan in this market involves a principal of S$1462 and repayment period of 3.4 months. At the outset, unlicensed moneylenders universally quote a face interest rate of around 20% over a six-week period with weekly payment. Our imputation suggests that the effective interest rate of loans of this size and repayment period is high at 172%.[10] In Singapore, the maximum amount of total fees

[8]FDIC Audit Report (2006) states that "Characteristics potentially associated with predatory lending include, but are not limited to, (1) abusive collection practices, (2) balloon payments with unrealistic repayment terms, (3) equity stripping associated with repeat refinancing and excessive fees, and (4) excessive interest rates that may involve steering a borrower to a higher-cost loan."

[9]Collard *et al.* (2006) asserts "They (lenders in UK) therefore obfuscate both the cost of the loan and the terms on which it is made, ... The most important of these are disproportionate and often arbitrary penalty charges for missed payments and small "top up" loans –often to enable payments on the loan that might otherwise be missed. ... borrowers cannot calculate what they owe or for how long they may have to go on paying the lender. Amounts actually paid to the lender can bear little relation to the amounts advanced or to the borrower's understanding of price at the outset."

[10]We impute this effective interest rate using a non-linear estimation and a model assume equal weekly interest and penalty fee for the first 6 weeks and a different weekly interest and penalty fee after first 6 weeks. Hence this is a conservative estimation of 6-weeks effective rate.

(including late fee, interest, legal fees and administrative fees) that licensed moneylenders can charge cannot exceed 100% of the principal. Our imputed effective interest rate is 72% higher than this cap. Furthermore, this interest rate is for a 3-month loan, and will be even higher if we translate it to an annual effective interest rate. Even for the cases where borrowers repaid as scheduled within 6 weeks, they are observed to bear additional costs of 20-80%. Thus it is implausible that such a high effective interest rate is entirely attributable to borrowers.

It is rare for any borrower to completely default on a loan. Most borrowers cannot bear the mental stress from being harassed. For example, taking out illegal loans is heavily frowned upon in Singaporean society, and many borrowers are desperate to avoid public shaming. Thus, they will do everything possible to repay the lenders (Tan, 2012). Another reason is that borrowers need to borrow repeatedly to satisfy their addiction. Being familiar with the market and knowing the severe potential penalties, few borrowers have the courage or intention to default on purpose.

2.2 Enforcement Activities

Prior to 2009, there was very limited information regarding unlicensed moneylending activities in official venues. The only statistics we found show a rapidly growing trend in the number of crime cases related to unlicensed moneylending and harassment activities during 1998-2009 (see Figure 1).[11] From 2009 onwards, the Singaporean authorities made a continuous effort to clamp down on unlicensed moneylenders and to discourage borrowers from participating in this market. (Singapore Police Force 2012, 2013; Kalyani 2012).

We provide an overview of the major policies implemented.[12] In 2010, several amendments were made to strengthen the "Moneylenders Act" against unlicensed moneylending activities (Ministry of Law, 2010). These changes included an increase in the jail term and fines that can be imposed on unlicensed moneylenders, and extended the penalty to individuals assisting the lenders as well (Ministry of Finance Singapore, 2013). According to the Singapore Police Force (2012), the National Crime Prevention Council (NCPC) set up the X-Ah-Long Hotline in August 2010 to source information anonymously from the public to better combat this market. Effective May 2012, as part of the Community Policing System, the Singapore Police Force installed CCTV cameras in HDB blocks (public housing buildings) and nearby parking lots (Coconuts Singapore, 2016). In the meantime, the Singapore Police Force and NCPC launched the inaugural Anti-Unlicensed Moneylending Public Education and Awareness Campaign on 30 November 2012 (Kalyani, 2012). Additionally, the civilian community in Singapore has also cooperated with the Singapore Police Force. According to the Singapore Police Force (2012), close to 3,800 Neighbuorhood Watch Groups were formed to keep watch over residential neighbourhoods. As of 2015, according to the Singapore Police Force (2015), the Citizens on Patrol (COP) scheme has over 700 COP groups with more than 14,000 mem-

[11] See Supplementary Appendix Section B.1 for more information about court cases involving harassment activities and how the law has dealt with these offenses.

[12] See Supplementary Appendix Section B.2 for a timeline of the different enforcement policies implemented by the authorities over time.

bers. Henceforth, we refer to all government regulation, police actions and other campaigns implemented from 2009 to date as "enforcement" by the authorities.

Enforcement by the authorities had a significant impact on this market.[13] The total number of unlicensed moneylending and harassment related cases dropped to a ten-year low in 2015 (see Table A6 in Supplementary Appendix Section E). There were 4,873 cases in 2015, a 26% fall from 6,553 cases in 2014, and a 74% fall from the peak of 18,649 cases in 2009. The majority of the total unlicensed moneylending cases are harassment related, and a fall in total cases is mainly attributable to the decline in this category.[14] The total number of people arrested that were linked to unlicensed moneylending and harassment cases increased from 505 in 2008 to 1981 in 2011, plateaued in 2012 and 2013, and decreased to 1468 in 2015.[15] The decrease of arrests in the later years could be because there were fewer lenders in the market after years of intensive enforcement. According to the Singapore Police Force (2010), half of the people arrested are borrowers turned debtors. Many borrowers became runners for lenders as a form of debt repayment (Next Singapo n.d.; Asiaone 2014; Today Online 2017).

Overall, the public data shows that enforcement successfully reduced the number of lenders and curbed unlicensed moneylending activities. We will explain how enforcement impacts the inner workings of the unlicensed moneylending market using our survey data in Section 6.

3 Literature Review

Burdett and Mortensen (1998) develop a sequential on-the-job search model in which firms post wage offers, whereas workers search for jobs under employment or unemployment. The unique equilibrium of the model exhibits a non-degenerate wage dispersion even when all workers and firms are identical. The model also shows that firms offering higher wages have larger labor force sizes and lower turnover rates. Galenianos *et al.* (2012) enrich the model of Burdett and Mortensen (1998) by incorporating a moral hazard problem to study the retail drugs market. In this market, buyers incur search costs when sampling new sellers, while sellers have the moral hazard to cheat on the purity of drugs in transactions. The authors find that moral hazard gives rise to a mass of "rip-offs" in the distribution of purity of drugs – a situation where the purity of drugs is zero. The model is consistent with many stylised facts exhibited in the retail drugs market, and therefore can provide novel insights for the design of policy and enforcement.

We are heavily indebted to the analytical framework developed by Burdett and Mortensen (1998) and Galenianos *et al.* (2012). With a few minor modifications, we reapply the model from Galenianos *et al.* (2012) to another underground industry - the unlicensed moneylending market. First, search friction in our setting is modeled such that borrowers can find new lenders only with a probability less than one. This reflects how borrowers in this market face a barrier in terms of gaining access

[13]Refer to Supplementary Appendix Section B.3 for quotes and reports from Singaporean government officials about the effectiveness of these enforcement efforts.

[14]See Figure A2 in Supplementary Appendix Section E.

[15]see Figure A3 in Supplementary Appendix Section E.

to lenders. Second, asymmetric information, parallel to the moral hazard problem in Galenianos *et al.* (2012), in our setting refers specifically to the situation where lenders can unilaterally determine the amounts of money to charge from borrowers in the loan repayment stage. Third, our setting is in discrete time in which each period consists of two stages: a loan issuance stage and a loan repayment stage. The division of these two stages in a period reflects the dynamic nature of each loan transaction, and is also important for the rise of the asymmetric information problem. All other aspects of our setting are modeled in the same manner as Galenianos *et al.* (2012).

In Galenianos *et al.* (2012), the mass of "rip-offs", if present, is constrained at zero by the fact that drugs cannot have lower than zero purity. On the contrary, the "rip-offs" in our model is a high level of markup, which is a positive number and does not have to be fixed. When the market environment changes, the mass point of the distribution of markups in our model can not only appear or disappear, but can also shift left or right. This property generates additional pieces of comparative statics and policy implications that differ from that of Galenianos *et al.* (2012).

Following the key insights of Galenianos *et al.* (2012), Galenianos and Gavazza (2017) develop a structural model to quantify the effects of search frictions and moral hazard on the retail drugs market. They find that if drugs could be legalised and thus if the purity of drugs could be regulated, the average purity of drugs will improve by about 20% and the dispersion of the purity of drugs will reduce by about 80%, indicating that the dispersion of purity is mainly caused by moral hazard rather than search frictions. The authors also show that increasing the penalties for drug-related offences may in turn raise both the purity and affordability of the drugs traded. Following these studies, we contribute to the literature by applying their insights to an unlicensed moneylending market.

Our paper is related broadly to the literature on search under asymmetric information. Some monetary search models consider the situation where producers strategically determine the quality of their goods which is imperfectly recognizable to buyers, and explore the role played by money in alleviating information asymmetry and improving the welfare of transactions, i.e., Williamson and Wright (1994), Kim (1996), Trejos (1999) and Berentsen and Rocheteau (2004). In these papers, trading parties meet randomly and pair wisely in each period. Therefore, in contrast to ours, there is no interplay between the long-term trading relationship and the quality of goods. Some other papers use a competitive search framework to study labor markets in which employees have private information about their effort or types and investigate the impact of information asymmetry on the optimal (and potentially dynamic) wage contracts, i.e., Guerrieri (2008), Guerrieri *et al.* (2010), Moen and Rosén (2011), Moen and Rosén (2013) and Tsuyuhara (2016). In this framework, employees direct their search after observing all wage contracts posted by employers, which is distinct from the sequential search framework we are following. As a result, these two search frameworks give rise to very different interplay between the trading parties.

Our paper is also related to the literature on search and crime. Studies in this literature mainly use search models to examine the interaction between formal labor markets and crime, as well as to assess the effects of various policies, for example, Burdett *et al.* (2003), Burdett *et al.* (2004), Huang *et al.* (2004), Engelhardt *et al.*

(2008), Engelhardt (2010), Chang *et al.* (2016). These papers, with the exception of Chang *et al.* (2016), model criminal activities as individuals' alternative choice other than their choice of job status, and pay no attention to the inner structure of markets where illegal trades occur and criminal activities take place. This differs from the studies by Galenianos *et al.* (2012), Galenianos and Gavazza (2017) as well as ours substantially.

4 Model

In this section, we briefly present the model and its main predictions. A complete characterization of the model and proofs are detailed in Supplementary Appendix Section C.

4.1 Setup

In the unlicensed moneylending market, there is a continuum of homogeneous borrowers with measure μ and a continuum of homogeneous lenders with measure ρ. We assume that μ and ρ are exogenously given. Time is discrete and goes to infinity. All market participants share the same discount factor β.

In each period, each borrower (or "she") has a need of one unit of money. If the borrower obtains a loan from a lender (or "he"), the immediate payoff generated from the loan is u for the borrower. If the borrower fails to obtain a loan from a lender, the borrower's payoff in this period is 0.[16]

If a loan has been disbursed, the lender unilaterally decides the markup to charge the borrower during the loan repayment process.[17] We denote the markup as e. The borrower has no knowledge about the markup at the time of obtaining the loan. However, she learns it perfectly after completing the loan repayment process. Thus, the markup determined by the lender represents the asymmetric information problem in the loan transaction. To ensure that the borrower complies with loan repayment, the lender must harass the borrower, which is costly to him. Let $k(e)$ denote the cost of harassment that increases in the markup e.

Let $\overline{e}$ be the maximal markup that the lender will charge in a loan transaction. We interpret $\overline{e}$ as the borrower's "shame avoidance value"; that is, the maximal value that she is willing to pay the lender to prevent her unlicensed loans from being made public to her family and community. If the lender attempts to charge a markup higher than $\overline{e}$, the borrower would rather default on the loan by choosing to go into hiding. Hence, the lender rationally limits his choice of markup lower than $\overline{e}$. Let $v(e) = e - k(e)$. We assume that $v(0) = 0$, and $v(e)$ strictly increases over the range $[0, \overline{e}]$. We also assume that $u > \overline{e}$. This assumption implies that even if all

[16] We make the assumption that the unbanked individuals cannot access loans from formal financial institutions. Refer to Supplementary Appendix Section A.4 for the rationale behind this assumption.

[17] When a borrower meets a lender to take out the loan, the lender typically sets an interest rate, for example, 20% for six weeks. However, both parties know that this interest rate is not enforceable. The extra interest rate, or markup here, will be determined by the lender in the loan repayment stage.

lenders choose to charge $\overline{e}$, borrowers still prefer borrowing from lenders rather than not borrowing at all. Thus, the net payoffs of a loan are $u - e$ for the borrower and $v(e)$ for the lender, where $e \in [0, \overline{e}]$. Lastly, we simplify our analysis by assuming that each lender charges the same markup e from all his loan transactions. As a result, a borrower knows (or can correctly estimate) a lender's choice of markup if she has taken out a prior loan from this lender.

Search frictions exist in the market. At the beginning of any period, each borrower is in a state of *matched*, which implies that she has a regular lender whom she can return to, or in a state of *unmatched*. If the borrower is unmatched, she finds a lender randomly in the market with probability $\gamma \in (0, 1)$. If the borrower is matched, she can still search for a new lender in the market, but she has the option of returning to her regular lender who would be available with probability $\theta \in (0, 1)$ in the current period. In the market, lenders often go into hiding to avoid detection by the authorities. we use probability γ to represent how readily available lenders are to new borrowers, and probability θ to represent the availability of lenders to their regular borrowers.[18]

The transition between the unmatched and matched states occurs as follows. If a borrower meets a new lender in a period, after their loan transaction the borrower decides whether to match with this lender. If the borrower forms a match with the new lender, then this lender becomes her new regular lender. If the borrower does not form a match with the new lender, then there are two possibilities: if the borrower was previously matched, she would remain matched with her original regular lender; whereas if the borrower was previously unmatched, she would remain unmatched. Moreover, a match between a borrower and a lender is exogenously terminated with probability $1 - \delta \in (0, 1)$ between any two periods. This means that thereafter, the borrower becomes unmatched. In the market, lenders may get arrested or choose to exit the market because of the fear of being arrested, which may cause the exogenous termination of matches between lenders and borrowers. We use probability $1 - \delta$ to capture these situations.

Here we also discuss the rationale behind some key assumptions made in the model. First, we assume that the markup charged by the lender is independent of the borrower's actions (i.e., the borrower's repayment record). Conversations with both borrowers and lenders in this market reveal that lenders typically have a predetermined amount of money they want to extract from borrowers when disbursing the loans, regardless of the circumstances. Our data regressions provide additional support. We find that variations of markups are mainly driven by variations of markups across different lenders rather than within each lender. Moreover, adding the borrower's observed characteristics or the variable "whether a borrower repays in full and on time" into the regressions have almost no additional predictive power on the levels of markups. This set of evidence leads us to build the model in such a way that the markup on a loan only depends on the lender, and not the borrower.

Second, we normalise the loan size to be a unit. Although this assumption is mainly made for tractability, it has justification from our data and empirical analysis.

[18] If some lenders go into hiding, the measure of available lenders in that period would be less than ρ. However, the qualitative results remain unchanged even if we modify the model by taking into account this fact.

For empirical analysis, we use the markup-a ratio that factors in loan size-as the key variable to test the predictions. Besides, our data suggests that the loan size is mainly determined by lenders. Table 2 Panel A shows that lenders approve the loan amounts that borrowers asked for in only about 60% of the transactions, and that this rate decreased to 10% after enforcement. This empirical fact suggests that we can model the loan size as an exogenously determined function that is decreasing in enforcement parameters. Moreover, our simulation of the distribution of the lenders' markup levels fits the data well when the loan size is not incorporated in the model (see Figure 1).

Third, we assume that the borrower can voluntarily separate from the lender after the completion of the loan transaction. In this market, it may appear that unlicensed moneylenders have the power to retain a borrower. However, our fieldwork shows that this does not happen very often in reality. There are two possible outcomes after a loan transaction has been concluded: either the lender has not extracted enough money from the borrower, or the lender has extracted too much. In the first scenario, the borrower would proactively keep returning to the lender willingly because it is not easy to find better alternative sources of loans. Thus, there is no need for the lender to force the borrower to stay.[19] In the second scenario, the borrower's financial stress and psychological stress have already been pushed to the maximum. It would become increasingly costly and risky for the lender to keep harassing the borrower, which decreases the potential profits the lender can extract. Furthermore, since there is abundant demand for illegal loans, lenders would gain more profit by transacting with new borrowers who still have untapped financial resources to give up.

Lastly, in the model we assume that the lender's choice of markup must be made conditional on a loan being disbursed. In reality, lenders do not randomly harass non-borrowers for money because these non-borrowers will notify the authorities, who will promptly arrest the lenders. However, the situation is very different for borrowers. These borrowers are unlikely to make police reports for one simple reason: if they notify the authorities, they will have to formally declare that they have taken out illegal loans, which would destroy not just their personal reputation but also their family's reputation. Knowing that borrowers want to avoid public shaming, lenders will capitalise on this weak point while harassing borrowers.

4.2 Predictions

We look for steady state market equilibrium of the model. In equilibrium, an unmatched borrower decides to match with a lender if and only if the lender's choice of markup is lower than a cutoff value, which is denoted as e^*. A matched borrower decides to match with a new lender if and only if the new lender's choice of markup is less than the markup charged by her original regular lender. The markups charged

[19]For example, in 2012, Quek Li Hao took a loan of S$500 from an unlicensed moneylender, "Paul", as he needed money urgently. Within a few months, Quek went back to Paul on his own accord for more loans when he needed more money urgently (High Court Case, 2013b). In another example, a borrower took three illegal loans from 26-year-old Ng Kum Peng outside a gambling den along Balestier Road over a three-month period (High Court Case, 1995). The borrower returned to Ng each time because he needed more money to fuel his gambling addiction.

by lenders form a distribution F. For each lender, a lower markup reduces the profit of each loan transaction but can increase customer size and therefore the number of loan transactions, and *vice versa*. In equilibrium, these two effects cancel out and all lenders earn the same profit.

Result 1: Market equilibrium of this model exists and is unique. In equilibrium, the distribution F of markups is non-degenerate, and there are parameter values such that F exhibits a mass point on $\overline{e}$.

Borrowers have to search for and transact with lenders individually. Due to search frictions, there is no single level of markup that clears the market in equilibrium. If all lenders charge the same markup, a lender who deviates to charge slightly less would attract a discrete increase in terms of the number of customers and loan transactions, while the reduction of profit in each loan transaction is negligible. As a result, this lender can benefit from such a deviation. Moreover, this reasoning can be extended to show that the distribution F has no mass probability on $e \leq e^*$. Thus, in equilibrium, the market must exhibit a dispersion of markups.

However, a positive measure of lenders may charge the same markup $\overline{e}$ in equilibrium, resulting in a mass probability of the distribution F. Intuitively, if a borrower does not place high value on the loan from a particular lender (i.e., because of high γ, high $\overline{e}$ or low u, see Result 2 below), she would be less motivated to form a repeated borrowing relationship with the lender unless the lender's markup is low. Expecting this, rather than trying to retain borrowers by charging small markups, some lenders choose to maximise their profit from each loan transaction by charging markup $\overline{e}$.

As a comparison, the distribution of markups can not have a mass probability in a standard Burdett-Mortensen (1998) model, which does not account for the asymmetric information problem. If the model is degenerated to a Burdett-Mortensen model such that a borrower knows perfectly the markup she will be charged when sampling a new lender, the cutoff value for match formation is $e^* = \overline{e}$ in equilibrium. The reason is that without any information asymmetry, being matched is always better than being unmatched for a borrower. Hence, in equilibrium all lenders form long-term relationships with borrowers. But, if the distribution exhibits a mass probability at a particular markup level, lenders who deviate to charge a slightly lower markup are strictly better off. In Supplementary Appendix Section C.3 we provide a complete proof showing this result.

Result 2:
(1). For $\gamma \in (0, 1)$, there exists a cutoff value $\overline{\gamma} \in (0, 1)$, such that the average level of markup strictly decreases in γ for $\gamma \leq \overline{\gamma}$, and strictly increases in γ for $\gamma \geq \overline{\gamma}$.
(2). For $\theta \in (0, 1)$, the average level of markup changes non-monotonically in θ.
(3). For $\overline{e} \in (0, u)$, the average level of markup strictly increases in $\overline{e}$.
(4). For $u \in (\overline{e}, +\infty)$, there exists cutoff values $\underline{u}$ and $\overline{u}$, where $\overline{e} \leq \underline{u} < \overline{u}$, such that the average level of markup strictly decreases in u for $u < \underline{u}$, strictly increases in u for $\underline{u} \leq u < \overline{u}$, and is constant for $u \geq \overline{u}$.
(5). Changing the measures μ and ρ of borrowers and lenders has no effect on the equilibrium distribution of markups.

These comparative static results show the complexity of the potential impacts of enforcement on the lenders' choices of markups. Enforcement that deters or arrests lenders causes the following to happen: it reduces the number of lenders in the market (through ρ), thereby lowering the availability of lenders to borrowers (through γ and θ). While reducing the number of lenders has no direct impact on alleviating the lenders' choices of markups, lowering the availability of lenders may actually cause markups to rise. Awareness campaigns carried out during the enforcement that reduce the number of borrowers in the market (through μ) or weaken the borrowers' intention to borrow (through u) may also fail to bring down markups in the market. Moreover, public education that increases the cost borrowers must endure if they are publicly shamed through the revelation of their illegal loans can give rise to higher markups (through $\overline{e}$). Since enforcement affected the unlicensed moneylending market via various channels simultaneously, it is challenging to pin down the enforcement impact on any particular channel precisely. Nevertheless, the model generates the following predictions.

Prediction 1: The unlicensed moneylending market exhibits a dispersion of markups, and has a mass of loan transactions with very high markups.

This prediction is a re-statement of Result 1.

Prediction 2: After enforcement, the average level of markup increases.

Result 2 shows that, if policies and enforcement increase search frictions (so γ and θ become smaller), reduce the borrowers' utilities from the loans (so u is lower), or increase the borrowers' shame avoidance value (so $\overline{e}$ is higher), the average level of markup may increase.

Prediction 3: If a lender charges a lower markup, the probability that the borrower will continue to borrow from this lender is higher. Moreover, for the same markup e chosen by a lender, after enforcement, the probability that a borrower will continue to borrow from this lender is also higher.

Let $q_{t+\tau}(e)$ denote that, with the condition that a borrower has a loan transaction with her regular lender whose choice of markup is $e \leq e^*$ in period t, the probability that the borrower would have a loan transaction with the same lender in period $t+\tau$, where $\tau \geq 1$. Thus, $q_{t+\tau}(e)$ is a measure of how likely a borrower could be a recurrent customer to a particular lender. We can verify that

$$q_{t+\tau}(e) = \theta\delta^{\tau}[\theta + (1-\theta)(1-\gamma F(e))]^{\tau-1}$$

Clearly, $q_{t+\tau}(e)$ strictly decreases in e for $e \leq e^*$. Thus, the less a lender charges, the more likely a borrower would continue to borrow from him in the future.

We show in the proof of Result 2 that, after enforcement, the distribution of markups may end up as a new distribution $\widetilde{F}(e)$, which satisfies $\widetilde{F}(e) < F(e)$ for the particular e we consider. Replace $F(e)$ by $\widetilde{F}(e)$ in the above equation, then $q_{t+\tau}(e)$ increases. This gives us the second part of Prediction 3.

5 Data

5.1 Data Collection

Our dataset comprises two parts. The first part contains borrower characteristics and transaction data from the unlicensed moneylending market between 2009 and 2013. This proprietary data was sourced over 2011-2013 during the first author's tenure as a social worker. After he joined academia, he expanded this dataset to study the effects of policies and enforcement on the unlicensed moneylending market. The first author and his team of enumerators collected the second dataset in 2015 and 2016 where they traced the borrowing transactions made by the same group of borrowers from 2014 to 2016.

We mapped the universe of borrowers in the Singapore unlicensed moneylending market to develop a sample frame. The mapping methodology first identified the sites frequented by borrowers and then estimated the population size of borrowers at each of these sites. For example, these sites included gambling establishments and cafes where borrowers frequently socialised. We obtained information about each site via interviews with informants and implemented the snowball method thereafter.

A total of 48 enumerators were employed to conduct the interviews. The enumerators are local Singaporeans who had previously borrowed money in the unlicensed moneylending market. The pool of enumerators were chosen to ensure diverse backgrounds, which included ex-offenders, gamblers, small business owners and former unlicensed moneylenders. This strategy allowed better access to different types of market participants to form the initial respondent pool. The survey questionnaire was finalised based on conversations with the enumerators. The enumerators were also briefed on proper interview procedures and ethics before setting out for work. Each interview session lasted between 1.5 to 2 hours at a cafe of the respondent's choice. The refusal rate for participating in our study was very low at approximately 10%. There are three reasons for the low refusal rate. First, the interviewees, especially the borrowers, were happy for the remuneration of S$20 to S$40 received for each interview. Second, prior to the commencement of any interview, all respondents were properly notified of the research study's purpose and the team's commitment to maintaining the confidentiality of the respondents' personal information. This step was crucial because if the respondents felt that there was significant risk of information leakage, they would not agree to participate in the interviews. Third, the interviews were conducted with the recommendation or physical presence of someone whom the respondent trusted.

While we believe that the respondents generally provided accurate information, to further ensure the veracity of the information that was shared, extra monetary compensation of S$10 was paid if the respondents could provide physical evidence of the claims that they made in the survey. Examples of physical evidence include diaries, repayment schedules and phone messages with the lenders. The respondents were generally willing to share this information, with over 50 percent providing proof of their claims. Asking for physical evidence helped minimise the risk of recall errors.

Due to the highly sensitive nature of the data, we had to obtain approvals from appropriate Singaporean authorities and Nanyang Technological University (NTU)

IRB before conducting this study. We have also taken steps to find out how we can accommodate scientists who would like to replicate the regressions we have done on our dataset to verify that the results are accurate. In Supplementary Appendix Section D, we enclose a more detailed discussion on the data collection and empirical research methodology. For curious scientists, we also provide a clear path for replicating the analysis and collecting the similar data.

5.2 Data Description

Our data is holistic, covering the personal characteristics of 1,090 borrowers, detailed information of 11,032 loan transactions with unlicensed moneylenders, as well as some basic characteristics of each lender. The first set of data contains 8,878 (80%) transactions that occurred between 2009 and 2013, and the second set of data contains 2,154 (20%) transactions that occurred between 2014 and 2016. 97% of borrowers from the first set were interviewed again in the second set.[20] Since borrowing transactions did not occur on a monthly basis for most of the borrowers, we managed to obtain a complete time series of borrowing incidences across time for each borrower. In total, we have 5-10 loan transactions for each borrower. The smaller transaction size in the second set is due to the subdued unlicensed moneylending market after enforcement, which we will discuss in detail in the next section.

5.2.1 Borrowers

Table 1 displays the key characteristics of borrowers. The ethnic composition of borrowers reflects the composition of Singapore's population: 75% of borrowers are Chinese, 14% are Malay and 11% are Indian. The overwhelming majority of the borrowers are men, who on average are 38 years old. Around 80% have at least completed secondary school. A significant proportion of borrowers had prior participation in illegal activities. Around 45% of borrowers were or used to be gang members. Most of the borrowers had stable jobs and fell in the lower end of income distribution.

Most of the borrowers indicated they had bad habits that we believe led them to have financial problems.[21] At least 60% of borrowers were habitual gamblers. Nearly half the borrowers were alcoholics and 20% were drug users. Two thirds of borrowers had financial management problems and spent more than 40% of their income on lavish affairs such as treating friends or entertainment.

These claims are consistent with what we have observed from the loan transaction data, where needing money to gamble, to purchase drugs or to repay debts are common reasons for borrowers to borrow from unlicensed moneylenders. There were some borrowers who took out need-based loans, such as to pay rent, children's

[20] Of the 33 borrowers who were excluded from the second set, 6 had gone into hiding to avoid debt collection, 11 were high income earners and therefore did not borrow again from unlicensed moneylenders, and the remaining 16 were missing for unknown reasons.

[21] According to media reports, gamblers are the most common victims of unlicensed moneylenders.

education and hospital fees, but need-based borrowing was only cited in one third of transactions.

Borrowers' responses to questions regarding their borrowing experience also reveal a few notable insights. While borrowers did take loans from families or friends, the most popular source of loans was still the unlicensed moneylenders. These borrowers also had very low ability to repay their loans. Regardless of the source of borrowing, one third of borrowers claimed to face difficulties in repaying the loans on time, while the remainder regularly or very frequently failed to make timely payments. At the time of each interview, which was arranged at random, over 90% of borrowers had short-term debts.[22] These statistics are consistent with the patterns we observe in our loan transaction data, which reveal that borrowers did not usually borrow for temporary financial relief. Rather, they were saddled with perpetual debt and were financially insolvent.

Borrowers chose lenders based on referrals in more than half of the transactions. In about 10% of all borrowing incidences, borrowers picked lenders based on whether they believed these lenders would be less likely to use physical violence to ensure timely repayments. Interestingly, it turns out that we do not observe lower borrowing cost or harassment from referral-based loans, or from loans with lenders who were perceived to be less violent.

5.2.2 Loan Terms & Repayment

The principal amount of each loan ranged from as low as S$30 to as high as S$50,000 with a mean value of S$1,462. The average loan amount borrowers initially requested from lenders was S$1,777, but lenders approved the requested loan amount in only half of the cases. Loans were quoted at six-week tenors with installments due on a weekly basis. There was little variation in the face interest rate quoted by the lenders. The average rate agreed by both borrowers and lenders was 22%. This rate was almost 4 times higher than the maximum rate charged by licensed moneylenders.[23] As mentioned previously, lenders were never explicit about the penalty interest rate and late fee charges at outset.

While it is common for licensed moneylenders to require proof of income from borrowers, such practice is rarely observed among unlicensed moneylenders because borrowers in the unlicensed moneylending market are self-selected individuals who have inherently low repayment ability. Although unlicensed moneylenders can use illegal means to enforce repayments, they implement preventive measures to minimise the cost of such efforts. Similar to banks, lenders demanded borrowers' identification documents to conduct due diligence.[24] In 70% of transactions, lenders also asked for a friend's or a family member's identification documents. By surrendering ID, these friends or family members acted as guarantors for the borrowers. When lenders had low confidence in the borrowers' ability to service the loans (16% of cases), they

[22] Short-term debts refer to any debt incurred by a borrower due within the next 3 months.

[23] See Supplementary Appendix Section A.5 for a detailed comparison between a licensed moneylender and an unlicensed moneylender.

[24] For example, lenders would send runners to verify the borrower's resident address using his/her ID.

asked for their SingPass.[25] In these cases, borrowers were 4 times less likely to get the amount they asked for.

OLS regression shows that borrowers' characteristics explain 42% of the variation in loan amount, and only 16% of the variation is explained by lenders' characteristics. Lenders made full use of the borrowers' observed characteristics to determine the optimal loan amount to offer. Borrowers with higher income or no bad habits were more likely to obtain larger loans. Borrowers who were asked for SingPass received a loan size that was 26% smaller and paid 5% higher interest rate.

On average, it took 3.4 months for a borrower to settle the loan. In over 35% of transactions, this repayment period stretched over 4 months.[26] Borrowers failed to make full repayments as scheduled in 86% of loan transactions. Unlicensed moneylenders made lucrative profits from unilaterally-imposed late fees. Often, lenders even fabricated scenarios to impose late fees. For example, a borrower indicated in the survey that the lender insisted that the borrower had only made three installments, when in fact the borrower had made five. This information asymmetry traps the borrowers in a cycle of debt.

The lenders were very effective in reinforcing repayment using harassment. We find that 96% of all loans were eventually repaid in full. That includes the principal, face interest rate and whatever extra interest or late fee the lender imposed. Borrowers financed repayments by using income and by borrowing from other sources equally frequently. Borrowers could also receive debt forgiveness by helping the lenders launder money using the borrowers' own bank accounts.[27]

5.2.3 The Markup of the Loan

Recall that the only condition of a loan that both a lender and a borrower mutually agree to is the six-week interest rate that should be paid on the principal. At the loan inquiry stage, the lender will essentially agree to everything the borrower asks for when it comes to late penalties because the lender has no intention of keeping his promise. However, once the borrower has taken out the loan, the lender acts unilaterally and unfairly in almost all cases to extract extra profits from the borrowers via harassment.

A natural measure of the extra profit lenders extract from borrowers in the presence of information asymmetry is the markup of the loan, which we define as follows:

$$Markup = \frac{Total \quad amount \quad paid - Principal \quad (1 + Agreed \quad Interest \quad Rate)}{Principal}. \tag{1}$$

[25]The SingPass is a unique online identity that the government assigns to every citizen in Singapore. It can be used to access virtually all the information that the government has collected about that specific citizen. This information includes the individual's job history, medical records and housing payments. Citizens can also use SingPass to apply for online visas for friends visiting Singapore.

[26]Here we exclude the 462 cases where the repayment duration was not indicated in the survey.

[27]Working for lenders means that the borrower can help the lenders either to collect debt repayments or to promote loans to others. Under the "Moneylenders Act", borrowers who become runners for lenders would be subject to fines and imprisonment if caught. In 3% of transactions, borrowers were asked to work for lenders in order to repay the loans.

The agreed interest rate refers to the mutually agreed six-week interest rate of the loan. This formula effectively captures the unfair and deceptive amount of interest that lenders dictate, which will be further confirmed in the empirical analysis section. Since such monetary cost varies depending on loan amount, we define markup as a ratio of loan principal.

Among the 2,113 loan transactions where lenders did not harass borrowers, the mean markup was at 11% and the average repayment period was the contracted loan period of 6 weeks. One third of the transactions from this harassment-free sample display a markup of 20-80%. No harassment was implemented on these transactions, thus reflecting that these borrowers repaid installments as scheduled. According to the verbal contract, the borrowers should pay no more than the mutually agreed 20% face interest rate. However, we continue to observe that the lenders imposed 20-80% extra cost on the borrowers. This is hard evidence illustrating that lenders exploit the borrowers in this market when the borrowers are uncertain about the loan terms.

The remaining two thirds of the harassment-free sample involve transactions where the markup was negative. That is, the total amount the borrower paid was less than the sum of loan and interest. These transactions largely contain cases where the borrower successfully renegotiated the loan terms with the lender, which resulted in small discounts on the repayment. This is consistent with our finding in the empirical analysis section that lenders have different strategies and some of them are more benevolent.

Most of the harassment-free transactions are observed in sub-sample 2009-2013. In this early sample, the average markup was 94%. For the loan transactions with some level of harassment imposed, the mean markup was 108%. If we further exclude borrowers who borrowed with no intention to repay, the markup was higher than 200% in 25% of the loans.

5.2.4 Lenders

Identification of Lenders

Since borrowers had limited information about lenders, the characteristics we obtained about lenders were also limited. For each lender, we only have the following information: nickname, age range, and the lending capacity of the lender (referred to as "business size"). The bigger the loan or the more loans the lender was capable of issuing, the bigger the lender's business size.

For robustness, we create three distinct classifications of lenders: C1, C2 and C3. Under the first classification C1, we use the lender's name, age range and business size to identify 2,046 lenders. Under classification C2, we use the area where the borrower resided and the lender's name. Here, we assume that if there were two lenders who had the same name and transacted with borrowers from the same district, then they were the same lender. The rationale behind this assumption is that lenders are normally active in a fixed location, which is usually near the borrower's home. It is too costly for a lender to be active in several lending locations. We identify 3,622 lenders under C2. The shortcoming of C1 is that the business size of a lender may grow or shrink across time and result in a scattered time series. A

potential aspect that C2 may overlook is that some borrowers could transact with lenders located where they applied for the loans (i.e., gambling dens), instead of from lenders who were near their residence. To compensate for the drawbacks of C1 and C2, we create a third classification, C3, which identifies lenders using matches based on the lender's name and the borrower ID. For example, if Borrower 1 had two loan transactions with lenders under the same name, say "Ace", then we consider these two "Ace" lenders to be the same lender. This is the least restrictive classification by which we identify 5,612 lenders.

In all three classifications, we use the lender's name as one of the identification criteria. While not impossible, it is uncommon for a lender to keep changing names, as unlicensed moneylending is a referral-based business. A fixed name makes a lender more identifiable and is essential for reputation-building.

Lender's Harassment

The harassment imposed by lenders is another salient feature of the unlicensed moneylending market. Harassment is a powerful tool that lenders use to force the borrowers to repay. Lenders almost never harass borrowers in person. Instead, they hire foreign workers, school dropouts and debtors who are unable to repay their loans to conduct harassment activities.

In our survey, we asked: "Which of the following harassment activities has the lender done to you when you failed to repay in full and on time?" According to the answers, there are about 20 ways that lenders can use to harass borrowers, ranging from verbal threats, harassing the borrowers' families to physical attacks. Lenders decide the form and frequency of punishments, while considering the cost-benefit trade-off. Phone calls and verbal threats are the most common harassment methods used. When reminder calls fail to work, lenders will employ more aggressive strategies, such as visiting the borrowers' homes or splashing paint on the borrowers' doors. In rarer occasions, lenders also harass the borrowers' neighbours or family members to expedite repayment.

For easy comparison, we create two indicators to measure the lenders' degree of harassment. The first indicator, denoted as H1, focuses only on the most severe form of harassment that a lender had inflicted on a borrower. H1 is a discrete scoring measure ranging from 1 to 5; the higher the score, the more severe the harassment activity. H1 is coded as zero if no harassment was carried out on a borrower in relation to a particular loan.[28] The second indicator, denoted as H2, aims to capture the frequency of harassment without considering the actual magnitude of it. If a

[28] H1 is coded as 1 if harassment remains only at the verbal level: Verbal threats, Phone harassment/reminder calls, Demand letter/send note/threatening message; H1 is coded as 2 when borrowers experience the following: Shout at you in your neighbourhood, Stalk and shout at you, Harass you in your workplace, Visit your home, Visit your workplace; H1 is coded as 3 when the most severe punishment inflicts direct harm on the borrowers such as splashing paint/kerosene in your building, locking doors/gate, throwing flowerpots, vandalizing wall, graffiti, chain door/gate/block key holes/put superglue in key holes, scratch & splash paint on car; H1 is coded as 4 if the punishment is further extended to individuals apart from the borrower: Harass family members/friends, Harass neighbours; H1 is coded as 5 if punishment involves physical attack/torture, use or threaten to use the identification documents that had previously been surrendered to the lenders for criminal activities.

borrower indicated in the survey that a lender had harassed him via the phone and splashed paint on his house, then H2 is recorded as 2. A borrower who received a reminder call is counted as 1 regardless of the number of phone calls he actually received.

The use of harassment was highly correlated with the borrower's repayment behavior. While there were a few lenders who conducted an unusually high degree of harassment activities (i.e., only 1.7% of loans were associated with H1 rating above 4), most of the lenders used similar strategies to ensure debt repayment. The correlation between H1 and H2 is 0.71, implying lenders elevated harassment levels gradually and the longer the borrowers delayed repayment, the higher the frequency and severity of the harassment the borrowers received.

5.2.5 Impact of Enforcement on Unlicensed Moneylending Market

Little is known regarding how enforcement activities affected the unlicensed moneylending market. Here we highlight the changes that occurred in this market as the enforcement efforts took effect over the years. Panel A in Table 2 shows that loan size decreased from an average of S$1,650 during 2009-2013 to S$900 in 2014, and dropped further to S$420 during 2015-2016. In the meantime, a reverse trend is observed in the six-week interest rate between borrowers and lenders. This rate jumped from 20% in 2009-2013 to 30% in 2014, and further surged to 35% after 2014. Changes in loan size may reflect that lenders adopted more prudent practices. Lenders agreed to lend the amount of money borrowers sought, or more, in 61% of transactions before 2014. But, from 2014 to 2016 lenders only approved only 20% of transactions. The loan amount borrowers sought also decreased after 2013. This reflects that the lenders extended less credit to borrowers, as there is no plausible reason for borrowers to abruptly and collectively ask for smaller loans after 2013.

Panel B in Table 2 reveals more interesting observations. The average repayment period increased from 3.2 months during 2009-2013 to 4.5 months after 2013. Almost 100% of borrowers did not fully settle their loans within the mutually agreed time frame after 2013, while only 85% of them failed to do so during 2009-2013. We observe a 9% increase in borrowers who eventually cleared all loans after 2013. Lenders increased both the frequency and severity of harassment after 2013 to enforce repayment. Accompanied by the longer repayment period and higher level of harassment, lenders' average markup leapt from 56% during 2009-2013 to 230% after 2013.

These observations are the consequence of the lenders' and borrowers' strategic responses to tighter enforcement efforts. A growing number of unlicensed moneylending related arrests reported over time suggests that the unlicensed moneylending market had shrunk. Using lenders' entry and exit pattern in our data, we estimate an approximate 50% reduction in the number of lenders after enforcement. Among all lenders, only 30% remained active throughout the entire data period (from hereon, we will refer to this group of individuals as stayers).[29] 60% of all lenders who were active during 2009-2013 dropped out after this period (we refer to

[29] We define a lender to be active during 2009-2013 or 2014-2016 if he conducted a transaction at least once during those periods respectively.

them as dropouts). Lenders who entered the market after 2013 (we refer to them as newcomers) only constitute 10% of the total number of lenders in our sample.[30] Together with fewer unlicensed moneylending related crimes reported by the police force, these statistics help justify our model's assumption that enforcement increases search frictions, hence causing γ and θ to drop. Given data limitations, we are not able to perfectly measure these two parameters. However, we can offer a rough approximation. Using newly matched borrowers and lenders, we use the probability that a lender approves a borrower's requested amount to approximate γ. Using the matches between borrowers and their regular lenders, we use the probability that a lender approves a borrower's requested amount to approximate θ. Both parameters exhibit decreasing trends over the years (see Column (2) and (3) in Supplementary Appendix Table A7), which further supports our assumptions.

Government campaigns consistently warned the public of the dangers of borrowing from the unlicensed moneylenders, which might discourage the entry of new borrowers. However, we do not believe that the pool of borrowers experienced significant downsizing. Borrowers who borrow from the unlicensed moneylending market are not ordinary borrowers. They persist in approaching unlicensed moneylenders despite the unfavourable changes in loan terms after enforcement, because they do not have alternative credit options. This is also because borrowing from unlicensed moneylenders is not a crime in Singapore.

As enforcement intensified, the smaller number of lenders operating in the market made it more difficult for a borrower to repay debt by borrowing from other lenders. The active lenders during 2014-2016 also sought higher returns, and hence applied even higher markups on the loans. These pieces of information could help explain why the majority of borrowers could not settle loans on time and in full after 2013.

6 Testing Predictions

Testing Prediction 1: Dispersion in Equilibrium Markup

To verify Prediction 1 that different lenders choose to charge different markups from borrowers, we first calculate the mean markup charged by each lender and then graph the distribution of the mean markup in Figure 1. This distribution is widely dispersed and exhibits two modes with 80% falling below 200%. The coefficient of variance is high at 1. Recognizing that market dynamics were affected by enforcement activities over the years, we again produce the distribution of mean markup over time (see Supplementary Appendix Figure A4). The distribution of markup during years 2009-2013 is very similar to the full sample, with the exception of some clustering (or a mass point) at a rate of 250%. For years 2014-2016, we observe a right shift in distribution with an even wider spread over the domain. The standard deviation of markup increased from 0.95 in 2009-2013 to 1.05 in 2014-2016. Collectively, these statistics confirm that different lenders choose to set different levels of markup.

[30] The statistics are produced using lender classification C1. The estimated reduction in lender size is slightly higher at 55% and 58% using lender classification C2 and C3 respectively.

In contrast with the variations in markup across the lenders, the within variation is relatively small (see Supplementary Appendix Figure A5). About 60% of lenders have a standard deviation of this rate below 0.5. Notice that this is the markup without accounting for the different characteristics of borrowers and their loans. The within variation of markup levels could be much lower if these factors are considered.

In the full sample, the average markup of the stayers is 115%, which is higher than the 78% of the dropouts. When enforcement activities took full effect, lenders who participated in the market during 2014-2016 faced greater risks and less competition, and hence charged more. The average markup of the newcomers was very high at 235% during 2014-2016, which is even larger than the 138% charged by the stayers. This implies that the stayers treated repeated customers better despite the enforcement activities, but that the newcomers only aimed for one-off business.

Testing Prediction 2: Enforcement may Increase Lender's Markup

We test Prediction 2 using Equation 2, where we investigate how lenders reacted to enforcement by adjusting the markups. While the markup reflects the unfair monetary penalties lenders inflicted on borrowers, harassment captures the physical and mental torture lenders impose. Since lenders exercise harassment strategically to maximise profit, we also analyse how lenders adjust harassment activities in response to enforcement, using Equation 3.

$$Markup^*_{ijt} = \alpha_1 + \Sigma_t \beta_{1t} Year_t + \Gamma_1 L_{ijt} + \Psi_1 R_{ijt} + \Lambda_1 P_{ijt} + \Omega_1 X_i + \varepsilon_{1ijt} \quad (2)$$

$$Harassment^*_{ijt} = \alpha_2 + \Sigma_t \beta_{2t} Year_t + \Gamma_2 L_{ijt} + \Psi_2 R_{ijt} + \Phi_2 W_{ijt} + \Omega_2 X_i + \varepsilon_{2ijt} \quad (3)$$

where i is the borrower, j is the lender and t is the year of loan transaction.

The dependent variable $Markup^*_{ijt}$ in Equation (2) is defined in Equation (1). We estimate this equation with lender's fixed effects using all three classifications of lenders, as well as OLS. We cluster the errors at the lender's level in OLS using classification C1.

$Harassment^*_{ijt}$ is the latent variable of the harassment lenders inflicted on borrowers. Equation (3) is estimated by an ordered-logit model. We separately examine two proxies of harassment that were defined earlier: harassment in terms of severity (H1) and harassment in terms of frequency (H2).

The explanatory variable $Year_t$ is the categorical variable indicating the years from 2010 to 2016, with the base year being 2009. The coefficients β_{1t} and β_{2t} of $Year_t$ are the key estimates of interest revealing how lenders' markup and harassment changed over time as enforcement was rolled out.

L_{ijt} contains loan terms including log loan amount, log agreed interest rate, confidential identity,[31] whether the borrower repaid the loan in full on time,[32] the number of months the borrower took to repay the loan and whether the lender loaned the amount the borrower initially sought or not. Depending on the equations

[31] A set of confidential identity dummies contains whether a friend or family's identification document was used, whether the borrower's proof of income was provided to the lender, whether the borrower's SingPass was provided to the lender.

[32] A borrower repays the loan in full on time if he pays every installment amount as scheduled.

estimated, L_{ijt} may contain the full set or subset of the variables. R_{ijt} contains a set of dummies that document the reasons why the borrower borrowed from the lender, which includes factors such as need-based expenses, habits such as gambling or drinking, and repayments for other debts. P_{ijt} contains dummies for the different funding sources the borrower used to repay debt. This includes the borrower's own income, other sources of income, funds from other borrowings, money from selling valuable items and gambling profits. X_i contains the borrower's characteristics, including whether the borrower was a gang member, monthly income, employment status and whether the borrower had negative habits such as alcoholism, drug abuse or gambling. W_{ijt} contains a set of dummies for the reasons why the borrower transacted with a particular lender: it could be that because the borrower felt that the lender seemed "benevolent" (that is, the lender charges less), the lender was referred by a friend, or the lender was perceived to use less violence. We include one or a few of these indicators whenever appropriate in the regressions.

In all regressions, we exclude 588 observations where the total amount paid by borrowers was less than the principal loan amount. According to the qualitative remarks borrowers made in the survey, these cases were largely due to borrowers going into hiding, or where borrowers were able to obtain police protection. Thus, these cases represent exceptional incidences where the lenders' ability to harass was unexpectedly impeded, which is less relevant for our study.

Lender's Choice of Markup

The size of the lender pool dwindled as enforcement efforts intensified over the years. The coefficients of variable $Year$ in Panel A of Table 3 display how lenders adjusted markup levels as search frictions increased using OLS. 34% of total variation in markup is explained by variations across the *year* alone (see Column (1)). Markup increased amidst a tighter monitoring environment. However, such an increase was not completely linear. During the early enforcement years (2010-2013), lenders increased markups only by a moderate amount. It was not until after 2014 that we observe a greater increase in markup by a magnitude of 100-200%.

Two empirical hurdles may contaminate these results. First, many loan characteristics (loan amount, agreed interest rate, confidential identity provided etc.) had changed over the years. Therefore, what we observe in Column (1) may capture the effects that the changes in loan characteristics had on markup levels. Moreover, lenders use all available information to determine the amount to lend, the face interest rate to set and the types of ID cards to collect when issuing the loan. As mentioned previously, those who received less preferential loan terms were less likely to repay in full and on time. Hence, we further control for loan terms in Column (2), which also partially purges the effect of the borrowers' repayment ability. Under this specification, we see a smaller increase of markup levels ranging from 60% to 110% during 2014-2016, confirming that changes in markup over the years in part reflected the changes in loan terms and the borrowers' repayment ability.

Second, the observed markup may reflect both the lender's abusive charge, as well as the penalty the borrower was supposed to bear for late or partial payment. It is common for borrowers to default on repayment, as they have inherently low repayment ability. As discussed previously, it is well documented that the penalty

for late payment is never discussed at the disbursement of the loan, and it is up to the lender's discretion to set a penalty or to reset the entire loan repayment schedule. This is how lenders abuse borrowers through markup manipulation. We are not able to observe the borrower's full repayment history, in terms of the amount and time. However, we observe whether the borrower repaid in full on time and how long he took to finish the repayment. Admittedly, the repayment period is endogenous to a certain extent. By further controlling these variables in the regression, we only partially purge the markup changes that were associated with the borrower's inability to comply with the repayment schedule (see Column (3)). Nevertheless, the goal of the exercise is not to disentangle these two effects, but to demonstrate how enforcement affects the unexpected cost of the loan that borrowers had to bear. The R^2 jumps to 0.71 in this specification, confirming that the unexpected cost the borrowers had to bear in part reveals the penalty borrowers had to pay when they failed to repay as scheduled. Most of the added explanatory power is driven by the repayment month, and little is explained by whether borrowers repaid in full on time. Delaying repayment for one month results in a 39% increase in the markup the lenders place. Since the variable repayment month is longer during 2014-2016, we see an even smaller increase in markup at a magnitude of 0.6-0.7 in this specification. That is, the unexpected cost lenders imposed on borrowers increased by 60-70% after the enforcement took effect, after purging the cost increase that was due to borrowers' inability to repay.

As a robustness check, we further control for borrowers' characteristics and a set of loan-specific conditions that may influence the markup the lender imposed in Column (4). The loan-specific conditions include the purpose of the loan, why the borrower transacted with a particular lender and the types of funding sources the borrower used to repay the loan. Altogether, these variables do not add any additional predictive power on the variations in the markup.[33] While most of the borrowers' characteristics do not affect markup levels, we do observe that frequent borrowers were associated with higher markup.[34] After eliminating the borrowers' traits, the increase in markup is estimated to be 50-60% during 2014-2016.

Another potential concern is that the observed changes in the markup over the years were due to the changes in the composition of lenders. We tackle this concern by performing lender's fixed effects regressions in Panel B of Table 3. We use the same set of controls as laid out in Column (4) of Panel A. Columns (1)-(3) in Panel B present results using the classification of lenders denoted by C1, C2 and C3, respectively. The fixed effects results confirm that all lenders increased the markup they charged during 2014-2016.

In the meantime, one may argue that the increase in markup over the years may be because the pool of borrowers also changed at the same time and only those with worse repayment ability remained in the market after 2013. This is unlikely, as we only observe a 3% borrower dropout rate in our sample. Nevertheless, we perform

[33]Borrowers who borrowed from a lender because they believed that the actual cost of the loan with this lender was less were indeed subjected to loan cost that was 7% lower, but this is true only for the cases where the borrowers connected to the lender through referrals.

[34]That is consistent with the evidence from the news reports that even borrowers with decent incomes can turn into perpetual borrowers once trapped in the unlicensed loan cycle.

borrower's fixed effects. The estimated increase in markup under this specification is 20% smaller than that of under lender's fixed effects for years 2014-2016 (see Column (4) in Panel B), but remain largely significant. That is, any particular borrower who participated in the market during 2014-2015 faced a 24-50% increase in unexpected loan cost, compared to the base year of 2009.

In a nutshell, the markup lenders chose to charge did not change from 2009 to 2010. One would not expect lenders to immediately respond to the government's announced enforcement plans. As the enforcement efforts started to take effect more intensively during 2011-2013, lenders responded by increasing the markup by a moderate amount of 5%. A more exaggerated response from lenders only began in 2014. Our most preferred OLS specification suggests that lenders chose to increase the markup by 50-60% after 2014, as compared with 2009. Lender's fixed effects reports an even larger increase of 60-70% after 2014, implying that higher markup charged after 2013 was not driven by a small subset of tough lenders. Borrower's fixed effects shows a 27-50% increase in markup during 2014-2016, further supporting that the higher markup after 2013 was universal to every borrower, not only to those with low repayment ability. Collectively, we find strong evidence to support our prediction that lenders chose to charge higher markup in response to enforcement.

Lender's Harassment

Every unit increase in harassment levels correlates with a 22% increase in markup. In Table 4, we explore whether the lender's harassment strategy tracked the changes in the cost of the loan the borrower had to bear as enforcement intensified over the years. We present the odds ratio from the ordered logit regression using the harassment measures H1 (the severity of harassment) and H2 (the frequency of harassment) as dependent variables in Panel A.

In the early implementation phase of enforcement (2010-2013), lenders moderately decreased both the severity (see Column (1)) and frequency of harassment acts (results not shown) carried out against borrowers, as compared with the base year 2009. Coinciding with the leap in markup, we also observe an increase in harassment levels after 2014.

Harassment is a tool lenders utilised to reinforce repayment from borrowers. As illustrated in Column (2), the key factor that triggered lenders to harass a borrower is when the borrower failed to repay the loan in full on time (R^2=0.22). In such case, the probability the borrower would get harassed is 125 times greater than if he repaid in full and on time. To a lesser extent, harassment also hinges on the duration of repayment. The longer the borrower took to repay, the more harassment he would encounter (see Column (3)). Column (4) reveals that borrowers' characteristics, reasons for borrowing money, loan terms and reasons for choosing a particular lender only have negligible explanatory power for a lender's harassment decisions. Although some borrowers claimed they borrowed from a particular lender because the lender used less violence or because the lender was referred by a friend, these borrowers were in fact receiving approximately the same, if not worse, levels of harassment. This is largely consistent with the fact that borrowers are uncertain about the lender's markup strategy, even when it comes to lenders the borrowers were confident they believed knew well. The richest specification in Column (4) produces a very similar

trend of harassment changes as did under Column (1). The odds of a borrower receiving higher harassment levels in 2014, 2015 and 2016, in comparison with 2009, are 1.8, 2.5 and 3.2, respectively. That means lenders gradually used increasingly severe types of harassment to reinforce the repayment after 2013. In Column (5), we repeat the analysis as in Column (4) but use the frequency of harassment (H2) as the dependent variable. The frequency of harassment did decrease during the early years of enforcement (2009-2013). After 2013, there was a more moderate increase in harassment frequency, but such an increase is not statistically significant.[35]

Again, we perform both lender's fixed effects and borrower's fixed effects for changes in the severity and frequency of harassment (in Panel B). Blow-Up and Cluster (BUC) estimator proposed by Baetschmann *et al.* (2015) is adopted to perform fixed effects on ordered logistic regression.[36] The estimates are largely similar with ordered logistic as shown in Panel A.

In short, since the initial enforcement efforts by the authorities were mostly targeted at reducing harassment activities in the unlicensed moneylending market, we observe a spontaneous response from the lenders. They decreased harassment levels both in terms of severity and frequency from 2010 to 2013. However, the market reached a new market equilibrium as a lagged response to these external shocks in 2014. Most lenders found a way to avoid detection by the authorities, and harassing borrowers became less risky. According to our informants, many lenders relocated overseas and made use of technology such as smartphones to screen borrowers and give out loans. Lenders also hired proxies, such as foreigners who would never have in-person contact with lenders, to intensively harass borrowers. Hence, we observe more severe types of harassment implemented over time.

Testing Prediction 3: Borrower's Repeated Borrowings

We test Prediction 3 using Equation 4, where we study how a lender's choice of markup affects a borrower's choice to become a recurrent borrower of the same lender.

$$Recurrent^*_{ij} = \alpha_3 + \beta_3 Markup_{ijt} + \delta_3 H_{ijt} + \Gamma_3 L_{ijt} + \Omega_3 X_i + \Phi_3 W_{ijt} + \varepsilon_{3ijt} \quad (4)$$

where i is the borrower and j is the lender.

$Recurrent^*_{ij}$ is the latent variable capturing whether the borrower is likely to repeatedly borrow from the same lender. For each loan transaction a borrower provided in our survey, we ask "How many times you have borrowed from the corresponding lender before this loan". Using this information, we calculate the maximum number of times a borrower took out loans from a particular lender and call it $Recurrent^*_{ij}$.[37] Hence, this variable only varies at the borrower and lender level. We

[35] We have confirmed that the classification of scales for H1 and H2 are appropriate using a T-test on the coefficient of the cutoff points.

[36] Some cutoffs of the harassment variables (H1, H2) result in a small sample size. BUC estimator does not suffer from the potential problems associated with small sample sizes at some cutoffs.

[37] Let us illustrate this with a hypothetical example. Suppose Borrower A lists two loan transactions (i.e. Loan 1 and Loan 2) with Lender "Ace" in the survey. Loan 1 occurred in Jan 2010,

estimate this equation using OLS while clustering on the lenders using classification C1.

68% of borrowers took out loans from familiar lenders (we define familiar lenders to be individuals whom a borrower had transacted with at least once prior to taking out a new loan from this lender) in the 2009-2013 sample, and only 57% of borrowers indicated this was the case in the 2014-2016 sample. This again confirms that the number of lenders in the market shrank considerably. As a result, in 2014-2016, there was a higher likelihood of borrowers having to look for new lenders with whom they had never transacted with before. In light of the drastic changes in the market before and after 2014, we test Prediction 3 using the 2009-2013 sample and 2014-2016 sample separately. The results are presented in panel A and panel B of Table 5, respectively. Variable $Recurrent^*_{ij}$ is calculated for the two sub-samples separately. The standard errors are clustering on the lenders using classification C1.

2009-2013 Sample

The markup imposed by lenders played an important role in a borrower's repeated borrowing decision, whereas the degree of harassment inflicted by lenders had negligible impact (see Columns (1) and (2) in Panel A of Table 4). Every unit increase in markup reduces the number of repeated borrowings from the same lender by 1.5. Again, the borrowers' characteristics did not influence a borrower's decision to repeatedly borrow from the same lender (detailed result not shown). However, a borrower was more likely to repeatedly borrow from the same lender if the loan amount given to the borrower at the time of loan disbursement was higher or equal to the borrower's requested amount, or if the mutually agreed to interest rate was low (see Column(3)). Moreover, the longer the repayment duration, the less likely the borrower was to borrow from this same lender again. In Column (4), we control for all the aforementioned variables, the estimated coefficient of variable $Markup^*$ reduces to -0.57, meaning every 1.78 increase in a lender's markup would cause a repeated borrower to take out one loan less from this lender. Similar results are observed when using classification C2 as well. Notice that, even though the relationship between the markup of loans and the borrower's repeated borrowings is significantly negative, the magnitude is rather small. It is because most of the lenders are charging high markups and the search friction further hinders the borrowers from finding better alternatives.

2014-2016 Sample

When using the 2014-2016 sample, we continue to observe a negative relationship between the markup and the total number of times a borrower borrowed repeatedly from a lender (see Column (4) in Panel B), but with a smaller magnitude of -0.18. This means that every 5.5 increase in lender's markup would discourage the borrower from taking out one loan less from this lender. This is largely consistent with our

and Borrower A indicated that he had taken out another two loans at two different times prior to this loan from the same lender "Ace". Loan 2 occurred in Jan 2012 and Borrower A indicated that he had taken out another 5 loans at different times prior to this loan from "Ace". In this scenario, the value of $Recurrent^*_{ij}$ is 5.

theoretical prediction that as it becomes more and more difficult to find new lenders in the unlicensed moneylending market, borrowers will nevertheless become repeated borrowers of lenders charging high markups.

One may argue that the reason why we see a much weaker effect of the markup of loans on repeated borrowings in the 2014-2016 sample is attributable to the short time series. Furthermore, lenders entered and exited the market over time. The short time series problem may be more salient for the newcomers who joined after 2013. As a robustness check, we re-examine the problem by using only the stayers (as defined earlier, stayers are the lenders who were active throughout the entire sample period). We use $Recurrent^*_{ij}$ calculated for both the full sample and the subsample of 2009-2013, then re-estimate the regression specification outlined in Columns (4) using these two samples, only for the stayers. The estimated coefficient for $Markup^*$ is -0.57 for the sub-sample 2009-2013 and -0.003 for the full sample (see Supplementary Appendix Table E). These estimates help to strengthen our claim. During the early years of 2009-2013, a 1.75 increase in the lender's markup levels discouraged the borrower from taking out one loan less from this lender. Whereas, a 333-unit increase in lender's markup would have the same effect on the full sample, suggesting that a borrower's decision to repeatedly borrow from a lender was independent of lender's markup level during 2014-2016.

In summary, setting a higher markup discouraged a borrower from repeatedly borrowing from a lender during the early years of enforcement. When enforcement increased search frictions and made it more difficult for the borrowers to find a lender, the borrowers will nevertheless continue to borrow from lenders, even those who charge high markups.

7 Conclusion

Our paper analyses a unique dataset that tracks the behavior of borrowers in Singapore's unlicensed moneylending market over several years. In this market, borrowers search for lenders to borrow from, and lenders take advantage of information asymmetry on the loan terms to make extra profit from the borrowers. In equilibrium, different lenders choose to set different levels of markups. The higher markup a lender chooses to impose, the less likely a borrower will become a repeated borrower of the lender. As enforcement is executed over time, lenders increased the markups of loans correspondingly. A high markup is less likely to deter a borrower from repeatedly borrowing from a particular lender after the enforcement.

Illegal lending activities trigger intricate social and economic problems. Lenders in illegal lending markets are typically associated with criminal syndicates and borrowers belong to some of the most vulnerable groups of people in society. The available discussions on the effectiveness of policy in curbing illegal moneylending activities are mostly qualitative. Some discussions report mixed consequences of such policies. Gibbons (2012) documents that industry representatives argued the 2006 Money Lender law changes in Japan aiming to cap legal lending rate and to peg the limit on the total loan a borrower can take based on his/her income increased illegal lending. Whereas in the UK, Collard *et al.* (2006) have argued the opposite

is true. Regulation on legal lending market reduced the levels of over-indebtedness and significantly curbed illegal lending activities.

Our empirical results are close to the Japan case and suggest that the changes in the Moneylenders Act, accompanied with awareness campaign and increased policing, in Singapore reduced number of active lenders, elevated the total cost of loans and induced more severe types of harassment on borrowers. Our understanding is that policies that solely tighten regulation in legal lending sector or punish illegal lenders would not yield desired outcomes in the illegal lending market. The incidence of illegal lending in the UK is lower than in either France or Germany because borrowers having more legal credit options. Hence, providing more credit options to the borrowers, especially those at the edge of being excluded from the legal lending market, can be a plausible policy alternative for government to embrace when bridling the illegal lending activities. In the absence of credit alternatives, regulations may suppress illegal lending at the cost of the borrowers' welfare.

Table 1: **Borrower's Characteristics**

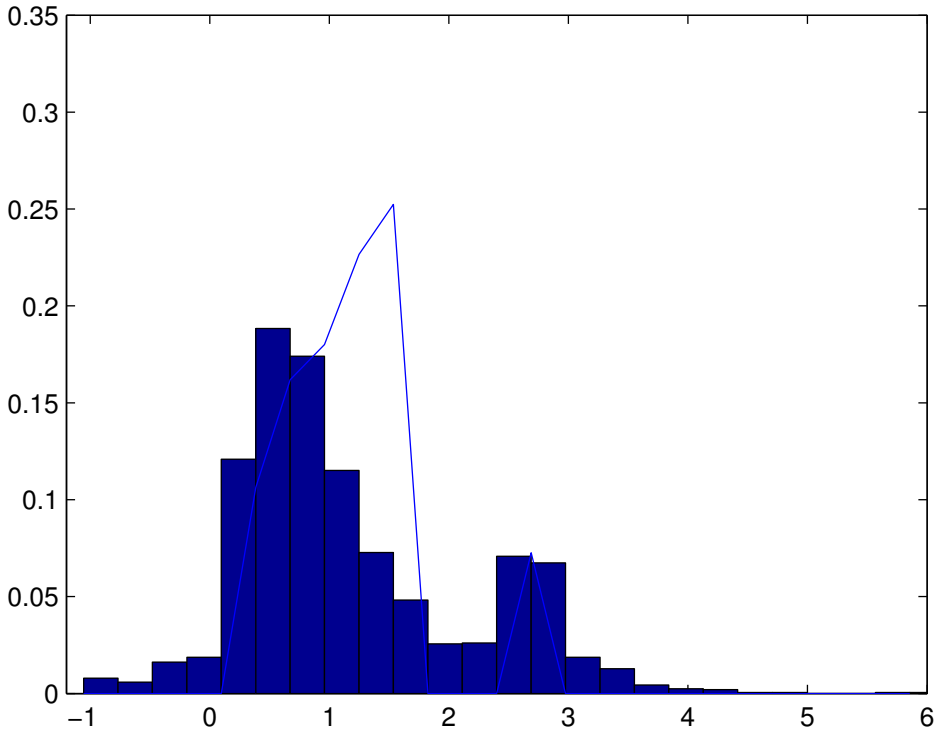
	Col %
Highest Education Level	
Illiterate	2.8
Elementary School	20.1
Junior School	36.6
Polytechnic	14.7
Junior College or Above	25.8
Ethnicity	
Chinese	74.5
Malay	14.1
Indian	11.1
Other	0.3
Gang Member	
Yes	14.1
No	56.6
Used to be	29.3
Working Status	
Jobless	1.4
Part time	7.0
Full time	91.6
Monthly Income	
Less than S$500 or No fixed income	0.3
S$500-S$1000	2.5
S$1000-S$2000	35.4
S$2000-S$3000	36.8
S$3000-S$5000	19.8
More than S$5000	5.2
Share of Monthly Income Spent on Lavish Affairs	
Less than 10%	0.5
10%-20%	3.2
20%-40%	39.2
More than 40%	57.2
Frequency of Drinking	
Never	3.6
Occasionally	16.6
Regularly	40.4
Very Frequently	39.3
Frequency of Drug Abusing	
Never	69.6
Occasionally	12.4
Regularly	10.3
Very Frequently	7.7
Frequency of Gambling or Purchasing Lotteries	
Never	7.0
Occasionally	26.0
Regularly	26.6
Very Frequently	40.5
Total	100.0

Table 2: **Changes in Market Structure**

Panel A: Changes in Loan Terms						
Year	Freq	Loan	Loan Sought	Agreed to Loan Amount Asked	Interest Rate	Total Amount Paid
2009	1423	1635	1844	0.68	0.19	2502
2010	2718	1575	1841	0.62	0.19	2485
2011	2498	1708	2000	0.60	0.19	2637
2012	1161	1826	2168	0.60	0.19	2841
2013	1078	1698	2073	0.56	0.19	2728
2014	551	938	1394	0.34	0.29	2562
2015	1441	417	899	0.13	0.35	1560
2016	162	469	954	0.14	0.38	1858
Total	11,032	1462	1777	0.52	0.22	2,468
Panel B: Changes in Loan Outcomes						
Year	Repay Month	Repay Full in Time	Finished Repay	Markup	Harass 1	Harass 2
2009	2.9	0.15	0.88	0.48	1.3	1.6
2010	3.1	0.18	0.92	0.55	1.2	1.5
2011	3.1	0.19	0.91	0.57	1.2	1.5
2012	3.1	0.20	0.94	0.57	1.1	1.4
2013	3.5	0.16	0.90	0.70	1.2	1.6
2014	3.5	0.00	0.97	1.60	1.5	2.8
2015	4.7	0.00	0.99	2.50	1.7	2.3
2016	4.9	0.02	0.99	2.50	1.9	2.3
Total	3.4	0.15	0.94	1.24	1.61	2.37

[1] Interest Rate is six-week rate following the standard practice in the market.
[2] Agreed to Loan Amount Asked or more in Panel A is the likelihood that lenders agrees to loan the borrower the amount the borrowers sought or more.
[3] Calculation for statistics for Panel B excludes the 462 cases where borrowers did not provide repay period.
[4] Finished Repay in Panel B equals 1 if Yes and equals 0 if No.
[5] Harass 1 in Panel B measures lender's harassment by the most forceful way.
[6] Harass 2 in Panel B measures lender's harassment by frequency.

Figure 1: Distribution of Lender's (mean) Markup



1.The blue bars represent the empirical distribution of lender's mean markup. We use the definition of lenders under classification C1.
2.The thin blue line represents the simulated theoretical distribution for parameter constellation of δ=0.91, γ=0.95, θ=0.56, $\overline{e}$=2.63, u=2.9, β=0.97.
3.Few outlines with markup greater than 6 are excluded.

Table 3: **Lender's Choice of Markup**

Panel A: OLS				
	(1)	(2)	(3)	(4)
Year (Base=2009)				
2010	0.063***	0.032	-0.008	-0.009
	(0.023)	(0.022)	(0.016)	(0.015)
2011	0.093***	0.071***	0.022	0.019
	(0.025)	(0.024)	(0.016)	(0.016)
2012	0.082***	0.077***	0.039***	0.027**
	(0.031)	(0.030)	(0.014)	(0.014)
2013	0.252***	0.215***	0.047**	0.028*
	(0.040)	(0.035)	(0.019)	(0.017)
2014	1.028***	0.564***	0.607***	0.516***
	(0.039)	(0.047)	(0.037)	(0.032)
2015	1.924***	0.998***	0.674***	0.600***
	(0.046)	(0.083)	(0.062)	(0.060)
2016	1.992***	1.051***	0.699***	0.609***
	(0.072)	(0.099)	(0.059)	(0.057)
Log Loan Amount		-0.312***	-0.197***	-0.298***
		(0.045)	(0.045)	(0.074)
Interest Rate (6 weeks)		1.734***	0.834**	0.822*
		(0.480)	(0.411)	(0.448)
Loan Amount Asked or More		-0.291***	-0.051***	-0.023
		(0.021)	(0.014)	(0.021)
Repay in-full on time			-0.009	-0.036
			(0.020)	(0.024)
Repay Month			0.393***	0.385***
			(0.005)	(0.006)
ID Dummies	No	Yes	Yes	Yes
Borrow Reason Dummies	No	No	No	Yes
Borrower's Characteristics	No	No	No	Yes
N	10439	10439	10305	10289
R^2	0.337	0.405	0.708	0.713

Panel B: Fixed Effects				
	C1 (1)	C2 (2)	C3 (3)	Borrower (4)
Year (Base=2009)				
2010	0.000	-0.008	-0.010	-0.009
	(0.025)	(0.019)	(0.019)	(0.024)
2011	0.030	0.009	0.013	-0.006
	(0.026)	(0.021)	(0.023)	(0.028)
2012	0.051	0.011	0.033	-0.062*
	(0.031)	(0.025)	(0.030)	(0.035)
2013	0.045	0.023	0.035	-0.031
	(0.032)	(0.027)	(0.033)	(0.039)
2014	0.578***	0.575***	0.522***	0.268***
	(0.049)	(0.039)	(0.055)	(0.047)
2015	0.640***	0.633***	0.640***	0.459***
	(0.066)	(0.056)	(0.069)	(0.061)
2016	0.670***	0.651***	0.686***	0.494***
	(0.089)	(0.073)	(0.089)	(0.082)
N	10305	10305	10305	10310
R^2 Within	0.665	0.790	0.828	0.663
R^2 Between	0.794	0.591	0.623	0.778
R^2 Overall	0.708	0.708	0.705	0.695

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[1] The dependent variable in this table is lender's markup.
[2] Column (1)-(3) in Panel B present the results from fixed effects using classification of lenders C1, C2 and C3 described in data section, respectively. The set of control various in all three FE regressions are identical to the specification in column (5) of Panel A.

Table 4: **Lender's Harassment**

Panel A: Ordered Logit

	H1 (1)	H1 (2)	H1 (3)	H1 (4)	H2 (5)
Year (Base=2009)					
2010	0.820**	0.857*	0.782**	0.775**	0.818**
	(0.056)	(0.066)	(0.064)	(0.064)	(0.059)
2011	0.842*	0.950	0.827*	0.833*	0.740***
	(0.059)	(0.075)	(0.069)	(0.071)	(0.055)
2012	0.660***	0.684***	0.574***	0.576***	0.648***
	(0.054)	(0.065)	(0.057)	(0.058)	(0.057)
2013	0.788**	0.749**	0.537***	0.572***	0.639***
	(0.066)	(0.072)	(0.054)	(0.059)	(0.058)
2014	2.062***	1.420***	1.351**	1.810***	1.167
	(0.196)	(0.146)	(0.145)	(0.212)	(0.124)
2015	3.048***	2.175***	1.302**	2.486***	1.147
	(0.228)	(0.176)	(0.113)	(0.419)	(0.177)
2016	3.907***	3.057***	1.718**	3.188***	1.178
	(0.604)	(0.491)	(0.283)	(0.684)	(0.241)
Repay in-full on time		0.00812***	0.0170***	0.0189***	0.0294***
		(0.001)	(0.002)	(0.002)	(0.003)
Repay Month			1.575***	1.692***	2.598***
			(0.022)	(0.028)	(0.048)
Log Loan Amount				1.508***	1.427***
				(0.072)	(0.060)
Borrow Reason Dummies	No	No	No	Yes	Yes
ID Dummies	No	No	No	Yes	Yes
Borrower's Characteristics	No	No	No	Yes	Yes
N	10427	10427	10296	10280	10294
Likelihood	-11441.431	-9241.086	-8430.545	-8319.965	-9949.442
Pseudo R2	0.031	0.217	0.271	0.279	0.328

Panel B: Fixed Effects

	Lender's FE		Borrower's FE	
	H1 (1)	H2 (2)	H1 (3)	H2 (4)
Year (Base=2009)				
2010	0.779*	0.809*	0.881	0.895
	(0.077)	(0.072)	(0.092)	(0.085)
2011	0.768*	0.707***	0.900	0.771*
	(0.083)	(0.070)	(0.109)	(0.085)
2012	0.471***	0.626***	0.608**	0.731*
	(0.067)	(0.077)	(0.095)	(0.101)
2013	0.496***	0.675**	0.597**	0.641**
	(0.071)	(0.086)	(0.106)	(0.105)
2014	1.421*	1.343*	3.120***	2.531***
	(0.251)	(0.201)	(0.685)	(0.521)
2015	2.074**	1.131	1.014	0.604*
	(0.535)	(0.277)	(0.306)	(0.148)
2016	3.669***	1.419	1.527	0.698
	(1.131)	(0.462)	(0.579)	(0.230)
Loan Terms	Yes	Yes	Yes	Yes
Borrow Reason Dummies	Yes	Yes	Yes	Yes
Collateral Dummies	Yes	Yes	Yes	Yes
Borrower's Characteristics	Yes	Yes	No	No
N	26788	27416	27745	28163
Likelihood	-6222.124	-5621.042	-6047.612	-5586.389
Pseudo R2	0.367	0.512	0.414	0.516

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[1] The dependent variable in this table is lender's harassment. H1 measures lender's harassment by the most forceful way he employed; H2 measures the frequency of harassment the lender employed.

[2] Panel A presents results from ordered logistic regressions. Odds ratio and standard errors are displayed.

[3] Panel B presents results from fixed effects ordered logistic regression using BUC estimator proposed by Baetschmann et al. (2011). Log odds are presented.

Table 5: **Lender's Markup and Borrower's Recurrent Borrowing**

Dep Var:Max Time Borrowed from A Lender	(1)	(2)	(3)	(4)
Panel A: Sub-Sample=2009-2013				
Markup	-1.450***			-0.566***
	(0.149)			(0.192)
Harassment by Most Forceful Way (Base=0)				
1		-0.364***		0.433***
		(0.091)		(0.090)
2		-0.837***		-0.065
		(0.239)		(0.222)
3		-1.669***		-0.101
		(0.119)		(0.119)
4		-0.758***		0.012
		(0.294)		(0.322)
5		-1.608***		0.392
		(0.491)		(0.399)
Log Loan Amount			0.417***	0.673***
			(0.082)	(0.094)
Interest Rate (6 weeks)			-6.832***	-10.894***
			(2.312)	(2.142)
Loan Amount Asked or More			0.949***	0.758***
			(0.081)	(0.080)
Repay Month			-0.566***	-0.401***
			(0.016)	(0.075)
Borrower's Characteristics	No	No	No	Yes
Reason to Borrow from Lender Dummies	No	No	No	No
N	8299	8284	8186	8162
R^2	0.152	0.027	0.189	0.256
Panel B: Sub-Sample=2014-2016				
Markup	0.210			-0.184**
	(0.181)			(0.077)
Harassment by Most Forceful Way (Base=0)				
1		0.058		-0.200
		(0.540)		(0.524)
2		-1.420**		-0.536
		(0.601)		(0.616)
3		0.925		0.505
		(0.567)		(0.595)
4		-3.047***		-1.395*
		(0.807)		(0.806)
5		-0.567		-0.403
		(2.325)		(1.883)
Log Loan Amount			-2.018***	-1.102***
			(0.285)	(0.303)
Interest Rate (6 weeks)			3.201	0.664
			(3.009)	(2.872)
Loan Amount Asked or More			-0.208	-0.204
			(0.293)	(0.276)
Repay Month			0.037	-0.155
			(0.080)	(0.100)
Borrower's Characteristics	No	No	No	Yes
Reason to Borrow from Lender Dummies	No	No	No	No
N	2136	2134	2119	2113
R^2	0.003	0.020	0.046	0.193

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[1] Lender is identified according to classification C1.

[2] We use standard error clustered at lender level using classification C1.

APPENDICES

This appendix is a supplement to the manuscript. Section A provides additional information about the unlicensed moneylending market in Singapore. Section B describes laws and enforcement effort that aim to combat the market. Section C contains the characterization of the model and the proofs of the results. Section D documents the data collection process and methodology. Section E contains additional figures and tables.

A Singapore's Unlicensed Moneylending Market

This section contains additional information about the unlicensed moneylending market in Singapore.

A.1 Extracting Money from Borrowers

In this subsection, we provide additional information about how unlicensed moneylenders charge exorbitant money from borrowers based on testimonies collected during the interviews. This information is excluded from the main paper due to space constraints.

During the 1990s, Ah-Long San was the most well-known lender and was notorious for harassing borrowers in the unlicensed moneylending market. Due to his infamy, "Ah-Long" is now commonly used to refer to a lender. Despite the arrest of Ah-Long San, the unlicensed moneylending market continued to flourish.

Borrowers in the unlicensed moneylending market are those individuals who have no access to formal financial markets. They take out loans for a variety of reasons. As one interviewee said, "I know of a friend who borrows money because his hawker business needs it. But most of the people I know borrow money because of gambling." Another interviewee claimed, "I am a student of gambling. When the urge arises, I need to borrow from lenders to gamble because I never have enough money." Thus, most borrowers are similar because they are not financially well off and are addicted to gambling. According to market insiders, gamblers in Singapore are "spoilt for choice" because there are many options available if one wants to gamble. For example, there are cheap boat cruises that one can take to gain access to legal casinos, illegal gambling shops physically located in some areas of Singapore, illegal online gambling websites, illegal bookies who can help customers place gambling bets on anything from horse races to soccer matches over the phone, legal casinos just across the border in Malaysia and readily available gambling apparatus such as mahjong tiles for recreational gambling in private residences. In short, according to one gambler, "There are a plentiful places and ways to gamble." The gambler is hardly an outlier. More than 50% of Singaporeans gamble, and gamblers form the majority of people who borrow from unlicensed moneylenders. According to Tan (2014), 58% of Singaporean residents aged 18 and above reported participating in at least one form of gambling activities in 2005. This figure dropped to 47% in 2011.

Unlicensed moneylenders are willing to lend to these borrowers despite their low income or poor credit history because these lenders are successful at charging

exorbitant money from them. At this juncture, we want to point out that in Singapore lenders in the unlicensed moneylending market do not have a license to give out loans or collect any amount above the principal from a borrower. Only legal licensed moneylenders are allowed to charge any form of interest on a loan. Thus, any amount that is requested by unlicensed moneylenders over and above the principal is illegal.[38]

The following is an illustration of the process of how unlicensed moneylenders charge money from borrowers in this market. Before a borrower takes out a loan from an unlicensed moneylender, the borrower receives no indication that the lender will charge exorbitant sums for late repayments. During the loan inquiry stage, the lender will display a pleasant disposition towards the borrower and accommodate all the borrower's questions about the loan. The lender will explain how much he can loan the borrower and at what interest rate. Should the borrower ask for more, the lender will patiently explain why he cannot increase the loan amount. The lender will also provide a long list of reasons as to why the interest rate is fixed at 20 percent, where the principal and interest have to be repaid over six or eight weeks. For example, he will say that the money loaned to the borrower is from someone else and the lender also has to pay very high interest rates for it. Given the financial constraints borrowers face, borrowers themselves know that they may not be able to make repayments on time. Thus, at the loan inquiry stage, the borrower will usually ask for concessions such as waived late repayment fees and a grace period of a few days to catch up on repayments. The lender will essentially agree to everything the borrower asks for when it comes to late penalties because the lender has no intention of keeping his promise as explained to us by an ex-unlicensed moneylender. For example, a borrower shared that a lender had verbally agreed to waive several late repayment penalties, and to allow the borrower a grace period of a few days.

Once the lender has agreed to give out the loan at the borrower's request, the lender does a basic background check which can include making copies of the borrower's identification documents and calling to ensure the telephone numbers provided are valid. The lender then hands out the cash to the borrower and reminds the borrower that the principal and interest have to be repaid over a six-week period. This concludes the disburse of the loan.

However, after the loan has been disbursed, should the borrower fail to make any of the payments on time, the lender would unilaterally impose unreasonable monetary penalties. The borrower could try to negotiate or remind that the lender agreed to waive the late repayment fees. But the lender would ignore what the borrower is saying and send runners to make physical and verbal threats. In our interviews, we asked borrowers whether they accept the financial penalties given that they were at fault for delaying repayments. A vast majority of respondents said since they did not agree to any penalties for late repayment, whatever lenders later force them to pay via verbal or physical threats is unfair. According to an ex-lender, lenders know that borrowers will oppose any fines. Thus, they have no

[38] On Singapore Statutes Online, Section 3 of Singapore's Moneylenders Act clearly states that "any person, other than an excluded moneylender, who lends a sum of money in consideration of a larger sum being repaid shall be presumed, until the contrary is proved, to be a moneylender."

choice but to force borrowers into complying with the new terms of loans that lenders unilaterally set. In other words, lenders will make borrowers feel that adhering to lenders' request is less costly than disobeying. In most cases, when a borrower chooses to disobey a lender, the lender uses acts of verbal and physical violence to force the borrower to submit the lender's demands.

Even if borrowers make installment payments on time, lenders will still charge money from borrowers. Let us explain how this works with an example. Suppose a borrower has taken out a loan from a lender. The lender has instructed the borrower to make the installment payments to a debt collector every Monday at 5:00pm for 6 weeks. On the Monday that the final installment was due, the debt collector was not at the designated location. The borrower tried to contact the lender but no one picked up the phone. The next day, the lender can simply claim that the borrower missed a repayment. The borrower can dispute this and try to negotiate with the lender and even provide proof that he tried to contact the lender. However, the lender will simply claim that it is the borrower's responsibility to get the money into the hands of either the lender or the debt collector on time. The lender then unilaterally declares that the borrower has to pay a late penalty. If the borrower tries to argue, the lender will impose more violence and threats. In the worst case scenario, the lender can just call up the borrower saying that the borrower has to repay the entire loan from scratch without providing a reason even if the borrower has made payments that the lender acknowledges have been on time.[39] Eventually, though the borrower is not at fault, the borrower ends up acceding to the lender's unreasonable demands.

Unlicensed moneylenders face very little downside in this business. There is little risk of default by borrowers and lenders can earn super normal profits because lenders are literally forcing borrowers to transfer all their valuables over to them. According to an ex-lender, "It is one of the most profitable businesses in the underground economy." According to Soh (2012), due to the extraordinarily high interest rates charged, many borrowers may have to use their wages and medical insurance or sell their homes to clear the debts owed to lenders. If borrowers are really unable to make repayments after numerous harassment attempts, lenders could force borrowers to commit crimes for them by laundering money, working for lenders to collect repayments and harassing other debtors, etc. As a former borrower claims, "I was charged because I didn't have money to repay my loan. In the end, I had to work for them as a runner. There is no escape. They always get what they want. One way or the other." Through harassment and underhanded tactics, lenders will get what they want from the borrowers.

Let us also explain why the default risk for a lender is low. According to the interviewees, lenders seem to know each borrower's greatest psychological weaknesses. For example, a borrower told us that his father had a bad heart and was in a bad state of health. Furthermore, the father saw his son as someone who could do no

[39] It is important to note that lenders generally differ in the frequency and intensity in the usage of these underhanded techniques. As an interviewee claims, "There are many different types of lenders. Some want to make more money quickly and thus use ruthless methods to get it. For example, even if I pay the installments on time, they will claim I missed some payments and punish me. Others are nicer and do not do these underhanded things as often."

wrong. In the words of this borrower, “My father would kill himself if he found out that I have borrowed money from lenders.” This borrower decided to talk about defaulting on the loan with a particular lender with some friends. A few days later, he received a call from the lender informing him not to harbor the thought of defaulting, otherwise the lender would have no choice but to notify his father about the illegal loan. He was shocked that the lender knew that this was the one thing that he could not risk. He said he would do anything to raise the money rather than default and be responsible for "killing" his father. This is the reason why default rates are so low. An ex-offender who was charged for unlicensed moneylending says that there are only two types of people who do not pay up: those who are "suicidal" and those who are going someplace where the lender cannot reach them like emigrating to another country with their entire families. According to him, these two groups of people consist of a very “tiny” fraction of the entire population of borrowers.

Last, lenders do not randomly harass and charge money from non-borrowers because these non-borrowers will notify the authorities, who will promptly arrest the lenders. However, the scenario is very different for borrowers who have taken out illegal loans. These borrowers are unlikely to make police reports for one simple reason: If they notify the authorities, they will have to formally declare that they have taken out illegal loans, and their family members and the press would get hold of this information. Even though borrowing from an unlicensed moneylender is not a crime, the borrower and his family’s reputation would be destroyed immediately. The intrinsic and extrinsic losses are enormous. For example, the borrower may lose his job because the lender may harass the employer to pressure the borrower to repay his debt. The borrower cannot lie to the authorities and claim that he did not take out a loan from the lender because that would constitute a crime. If the authorities discover that he lied, it is likely that his family members and the press would also catch wind of this news and find out that he was a borrower.

A.2 Locating Unlicensed Moneylenders

In this subsection, we discuss how borrowers locate unlicensed moneylenders.

Unlicensed moneylenders masquerade as licensed moneylenders in newspapers to evade detection and to increase their customer base. Tan (2017a) writes that unlicensed moneylenders unlawfully used websites, printed flyers and online media to advertise as registered companies, by including fictitious registration codes or legitimate business names of licensed moneylenders without these licensed moneylenders’ knowledge or approval. In 2011, in order to curb the ripple effects of over-borrowing and the dangerous influence of easy credit from these unlicensed moneylending activities, the Singapore government banned all moneylenders from advertising in newspapers. In addition, the government also introduced other restrictive measures such as requiring licensed moneylenders to only use telephone land lines approved by the Registry of Moneylenders as business contact numbers.

Despite the government’s ban on advertising through online and newspaper platforms, there were still instances where unlicensed moneylenders, posing as licensed moneylenders, continued to do so. One such creative method used by unlicensed moneylenders was to exploit their debtors. In a High Court Case (2013c), Goh Peng

Chai claimed viewing an advertisement in the New Paper for moneylending services in 2011. Goh ran his own printing business at the time. He ran into financial difficulties and was unable to obtain a loan from the bank to fund his housing loan and business. He dialed the number advertised and spoke to a person called "Ben", who offered him a loan of S$2,000 at an interest rate of 20% after asking for Goh's personal particulars and employment status. Goh was unable to repay the loan and in exchange for an extension of time, he printed 340,000 name cards and 40,000 flyers for Ben and Ben's friends who were also unlicensed moneylenders. The name cards and flyers were then used to advertise for these unlicensed moneylenders. This is just one of the situations detailing how unlicensed moneylenders exploited their debtors in order to market unlicensed moneylending activities.

Most people who borrow from unlicensed moneylenders have friends or acquaintances who already have the contact details of the unlicensed moneylenders. For example, in the 1990s, coffee shops were a popular place for moneylenders to meet up with borrowers.[40] The Straits Times (1988) reports that Mock Chee Meng was fined S$500 for running an illegal moneylending business from a coffee shop in Geylang. Pereira (1992) and Vasoo and Chua (1998) write that a customer, Mohammad Asri, met an unlicensed moneylender in a coffee shop in Little India, whom Mohammad knew through a friend. Mohammad borrowed S$2,000, and had to repay S$4,500 after interest. In a High Court Case (2011b), Nelson Jeyaraj borrowed from an unlicensed moneylender known only as "Ah Boy" through a recommendation from one of his acquaintances, "Ah Huat", whom he met during incarceration. Nelson took several loans from Ah Boy, but was unable to repay the loans and was hired as a runner to pay off his debts. In another High Court Case (2012c), Koh Suat Lay used her maid to source for potential clients. She faced seven counts of issuing loans of between S$300 and S$500 to four Filipino maids on seven occasions in 2009 and 2010.

A.3 Why Borrowers Turn to the Unlicensed Moneylending Market

In the next subection, we demonstrate that borrowers who borrow from unlicensed moneylenders do not have access to formal sector loans. We build on that subsection by explaining the types of urgent and recurrent needs that drive borrowers to have a repeated need for loans, even when they do not qualify for formal sector loans. In other words, we explain the causative link between borrowers' needs for money and their demands for unlicensed loans. Lin (2011) discloses that borrowers turn to unlicensed moneylenders for a combination of reasons such as gambling, business loans, overspending and seasonal circumstances such as medical expenditures. According to Toh and Leow (2009), most people who turn to unlicensed moneylenders

[40] In the early 1990s, secret societies still thrived in Singapore with an influx of triads from countries such as China, Hong Kong and Taiwan. Illegal moneylending was one of the activities that the secret societies undertook, along with other touting and bookmaking activities. Secret societies operated behind legal fronts, often masquerading as companies in the construction and entertainment fields. These gangsters were also known to operate at coffee shops, karaoke lounges and void decks.

are gamblers. Both are consistent with observations from our sample. In our sample, more than half of the transactions were made to sustain addictive habits such as gambling, consumption of drugs or alcohol. Apart from the purpose of sustaining addictive habits, there are other reasons that also drove borrowers to unlicensed moneylenders. These include paying medical bills, funding children's education or tiding over periods of poor business performance. These other reasons account for 33% of the loan transactions in our sample.

To illustrate the extent to which borrowers are desperate for funds, we provide real-life examples for every loan purpose cited above. These examples were sourced from publicly available material such as Singapore Parliamentary Debates, newspapers and organizations such as Blessed Grace Social Services, Arise2Care, Adullam Life Counselling, Credit Counselling Singapore and One Hope Centre. As most of these examples merely depict the extent of desperation that drive gamblers to locate unlicensed moneylenders, we turn to verbal accounts from our interviews to supplement the anecdotes found.

First, most borrowers in our sample were gamblers who were refused loans from licensed moneylenders. The borrowers were long addicted to gambling even before borrowing from unlicensed moneylenders. Based on verbal interviews conducted by us, several borrowers shared that they faced the perpetual urge to gamble despite gambling every single day. They would rather, in their own words, "commit suicide" if they were made to stop gambling. These borrowers would have exhausted legal means before turning to unlicensed moneylenders as their last resort for cash. These borrowers did not possess assets and had poor credit history, lacking creditworthiness to access the formal credit market.

According to Sim (2010), former Member of Parliament Irene Ng gave an example about a 16-year-old student who had an addiction to online soccer gambling and had racked up gambling debts of approximately S$30,000. As the student threatened to commit suicide if he were made to stop gambling, his parents not only paid off his debts but continued to fund his gambling habit with an allowance of S$200 to S$300 a week. Ng also shared another case of a taxi driver who borrowed from 41 unlicensed moneylenders to pay his gambling debts, as he could not stop gambling. These examples illustrate how gamblers have a pressing and recurrent need for money to sustain their gambling habits.

Second, some business owners may desperately need funds to prevent business closure. One borrower shared with us that he had never run a business before. He had maximised his borrowings from the formal sector as well as family and friends to start a business. However, the business performed poorly, and he needed funds urgently to keep the business afloat. Unwilling to accept failure and without any other alternative, the borrower took out a loan with an unlicensed moneylender in the hopes that his business would improve. However, the business continued to lose money. When the unlicensed moneylender sent runners to harass the borrower, the borrower became desperate and went to another unlicensed moneylender to take out another loan so that he could repay the first lender. Because the business never took off, this cycle of perpetually borrowing from one lender to repay another kept snowballing. Eventually, an initial debt of S$2,500 snowballed into more than S$50,000 in loans that he owed to 4 unlicensed moneylenders.

Third, individuals with an addiction to lavish lifestyles also require funds to sustain their high expenses. According to Chong (2016), Muhammad Jasni Mohd Mdet borrowed S$9,000 from licensed moneylenders to finance his lifestyle of clubbing and gambling. He later turned to unlicensed moneylenders when he exhausted his maximum loan limit from formal sources. There is another first-hand example from an ex-convict that the first author volunteered to rehabilitate in a Singaporean halfway house. This ex-convict, Andrew - not his real name - loved to drink very expensive alcohol with his friends. He would often go to different clubs and bars with his friends and order drinks for everyone on his own tab. Andrew became addicted to the compliments his friends gave to him for doing this. However, because he did not have the money to sustain this lavish lifestyle, he borrowed from unlicensed moneylenders. He had already sold his apartment and exhausted all his savings to buy his friends drinks. His wife left him because he had maxed out her credit cards and no formal sector firm would lend him money. He borrowed from relatives, friends and anyone who was willing to lend him money until he ran out of options. Finally, as a last resort, Andrew went to unlicensed moneylenders.

Fourth, some borrowers require money to support recurrent medical expenses. One borrower shared that he needed funds urgently for his mother to undergo chemotherapy overseas. As this borrower worked as an unlicensed hawker selling fruits outside the dormitories of foreign workers, he did not qualify for formal loans and had no choice but to take a loan from unlicensed moneylenders. However, he was unable to repay the loan because he continuously needed money to fund his mother's treatment. Out of desperation, he even asked a friend to take an unlicensed loan on his behalf. Although the borrower was aware that he would end up in a situation where he might not be able to repay the loans and would therefore have to endure constant harassment from unlicensed moneylenders, he shared that he was willing to do so for his loved ones. He was already living in a rented apartment (he did not own property) and everyone in his social circle also lacked the financial means to help him.

To summarise, urgent and recurrent needs for funds propel individuals to seek loans. Since these individuals are excluded from formal financial institutions as explained in the next subsection, they have no other alternatives but to turn to unlicensed moneylenders for loans. The reasons borrowers borrow from unlicensed moneylenders we discussed are similar across many countries. As seen in Canada, people borrow to gamble, consume drugs or occasional credit needs. Similarly, according to Financial Conduct Authority (2017), borrowers in the United Kingdom turn to illegal moneylenders for business loans or to sustain their gambling habit.

A.4 Do Borrowers Chose Unlicensed Moneylenders over Licensed Moneylenders?

In our model, we make the assumption that the unbanked individuals cannot access loans from formal financial institutions. In other words, the unbanked choose unlicensed moneylenders not because they are unaware of licensed moneylenders or of the benefits of borrowing from licensed moneylenders, but because the unbanked have no other choice. In this subsection, we explain the rationale and context behind

making this assumption.

Survey responses from borrowers reveal an understanding of the existing financial alternatives to banks such as licensed moneylenders and pawnbrokers. According to Zaccheus and Tai (2014), many of the 156 licensed moneylenders in Singapore are in prominent locations such as Chinatown or popular shopping malls. According to the Registry of Moneylenders published by the Ministry of Law, licensed moneylenders market their business through websites, business or consumer directories and business premises.[41] Pawnbrokers also advertise through the same channels, with the additional permission from the government to include television advertisements as well. Thus, the existence of licensed moneylenders and pawnbrokers is common knowledge to borrowers.

Despite awareness of options for legal loans, borrowers still turn to unlicensed moneylenders for two key reasons. First, some borrowers do not fulfil the minimum annual income requirement for legal loans. The following are the characteristics of the 1,090 borrowers we surveyed. 38.2% make less than S$24,000 annually. According to the Monetary Authority of Singapore (2013), the minimum annual income requirement for an unsecured non-credit card facility is S$20,000, while the requirement for a credit card is S$30,000. Based on the Registry of Moneylenders, individuals earning less than S$20,000 annually are eligible for an unsecured loan of up to S$3,000 from licensed moneylenders. Thus, based solely on annual income, many borrowers in our sample are ineligible for credit from formal financial sector. Ravi (2009) illustrates one such case where an individual had to borrow from an unlicensed moneylender to pay bills, as his monthly wage of S$800 fell short of the minimum annual income requirement of S$20,000 to be granted a bank loan. In a parliamentary debate, Hri Kumar (2010) also remarks that an unlicensed moneylender's typical customers lack the creditworthiness to borrow from banks and other licensed institutions, and thus resort to unlicensed moneylenders out of desperation.

Second, even borrowers who meet the annual income requirement can be still rejected by formal financial institutions for reasons including bad credit history, unstable jobs and unpaid outstanding loans. Many fall within the borrower profile deemed too risky for the formal sector. To illustrate, 67% of our sample identified themselves as gamblers, about 80% were alcoholic and 18% were drug abusers. 57% had financial management problems and spent more than 40% of their income on lavish affairs such as treating friends to free meals or entertainment. According to Ho (2008) in a parliamentary debate, these borrowers only turn to alternative sources of credit such as moneylenders, pawnbrokers, friends and relatives and unlicensed moneylenders only after failing to secure bank loans in times of pressing need. Some borrowers are very conscious that they would not qualify for bank loans, and thus as Toh (2011) further elaborates, would exhaust licensed moneylenders in the market before turning to unlicensed moneylenders as a last resort.

All the borrowers who qualified for legal loans in our sample had already maximised their borrowing limit for legal loans but were unable to repay their lenders. As these borrowers still required more money, they had no choice but to turn to unlicensed moneylenders, which is in line with the report by Lim (2016). According

[41] A list of business and consumer directories and their respective websites that licensed moneylenders capitalise on to promote their businesses is detailed at the end of this subsection.

to Today Online (2014), licensed moneylenders have even been punished for exceeding prescribed limits, indicating that borrowers do maximise their borrowing limits. Toh and Leow (2009) also document an anecdotal case of an individual who turned to unlicensed moneylenders after having maximised his borrowing limit from banks, family and friends. This borrower's case is typical of the borrowers in our sample.

Several developments in recent years may have made it even more challenging for borrowers to acquire loans from formal financial institutions. According to The Straits Times (2009), banks became more stringent with regards to unsecured lending activities in fear of potentially high default rates. Furthermore, following the recent amendment of the Moneylenders Act on 1 October 2015, which caps loan interest rates at 4%, licensed moneylenders became more risk-averse and cautious in their lending as the lower profits do not justify the risk of non-repayment. Koh (2016) mentions that licensed moneylenders responded to the legislation by issuing loans of smaller amounts, with some serving only regular customers, as issuing loans to new customers was deemed too risky. Coupled with the fact that some borrowers exploited the loopholes in law to avoid debt repayment (Tan, 2017b), it is not surprising that formal financial institutions applied more stringent screening to filter out risky borrowers. For borrowers with collateral, pawnshops are an alternative, as the loan interest rate offered by pawnshops is capped at 1.5% per month under the Pawnbrokers Act, which is lower than that of unlicensed moneylenders. A minimum redemption period for pledges is set at 6 months. Borrowers lose their collateral upon failure to redeem. In contrast, unlicensed moneylenders are less stringent in issuing loans as they use threats and violence to harass debtors into compliance.

Finally, the verbal accounts provided to us by twenty hardcore borrowers explain why they would prefer to borrow from licensed financial institutions compared to unlicensed moneylenders if given a choice. Formal financial institutions must act within the boundaries of the law during debt collection. According to these borrowers, the law creates opportunities for borrowers to default on payments with minimal disutility. One borrower shared that although a formal sector firm can send licensed debt collectors to chase a borrower for repayment, there is little the debt collectors can do to motivate the borrower to repay. The debt collectors are limited to non-violent and non-threatening actions that borrowers do not fear. In short, licensed debt collectors are unable to harass in ways that unlicensed moneylenders can. If these licensed debt collectors cross the line, borrowers can report them to the authorities. Another borrower shared that if a financial institution repossesses their assets (usually only furniture and home appliance) to resell at a second-hand auction, the borrower will hire someone to purchase these items back for them. They are able to do this because the people attending these auctions are second hand dealers who are only willing to bid very low prices on these items. Overall, borrowers have solutions for every action that licensed lenders can take against them. Two unlicensed moneylenders we spoke to shared that it is impossible to collect money from borrowers without breaking the law, as these borrowers are experts at using the legal system to their advantage.

In conclusion, borrowers either qualify for legal loans or they do not, hence turning to unlicensed moneylenders for loans. Based on information from market insiders, there may be people who know of licensed moneylenders and yet choose to

go to unlicensed moneylenders, but these are likely to be outliers. If these people exist, they are not captured in our sample. Our findings are in line with that of other countries such as the United Kingdom. Leyshon and Thrift (2007) mention that while some voluntarily opt out of the formal financial system, many more others who want to be included could not, due to low income. Rowlingson and McKay (2014) go further to claim that low and unsecure income is the root cause of financial exclusion. Rowlingson *et al.* (2016) also demonstrate the limited credit options that people without a good credit history have. The reasons that borrowers are unable to access credit from formal financial institutions may therefore share some similarities across countries.

A.4.1 List of business and consumer directories that licensed moneylenders utilise to advertise their business

Table A1: **Licensed Moneylender's Advertise Sites**

	Name of Directory	**Website**
(1)	Singapore Yellow Pages	http://www.yellowpages.com.sg
(2)	GreenPage SG	http://greenpage.sg
(3)	The Green Book	http://www.thegreenbook.com
(4)	EasyCredit	https://easycredit.com.sg
(5)	DirectorySG	http://directorysg.co
(6)	Angloinfo	https://www.angloinfo.com/singapore
(7)	inSing	https://www.insing.com
(8)	Recommend.sg	https://www.recommend.sg
(9)	eGuide	http://www.eguide.com.sg
(10)	Yalwa	http://singapore.yalwa.sg
(11)	Yelu	http://www.yelu.sg
(12)	DirectorySingapore	http://directorysingapore.sg
(13)	Hotfrog	https://www.hotfrog.sg
(14)	Moneylenders Singapore	https://moneylenders-sg.com
(15)	Zipleaf Singapore	http://sg.zipleaf.com
(16)	ThunderQuote	https://www.thunderquote.com/
(17)	Yelp Singapore	https://www.yelp.com.sg
(18)	GrowBusiness	https://growbusiness.sg/
(19)	Tuugo.sg	http://www.tuugo.sg
(20)	Singapore Business Directory	https://www.sgpbusiness.com/
(21)	Kompass	https://sg.kompass.com/

A.5 Unlicensed versus Licensed Moneylending Loans

In this subsection, we first provide an overview of the laws and regulations that govern the licensed moneylending transactions in Singapore. Next, we describe the actual terms and conditions for taking out a loan with these licensed moneylenders and compare these terms with those offered by unlicensed moneylenders. The information regarding loans from licensed moneylenders was obtained through phone conversations with actual licensed moneylenders.

According to the Registry of Moneylenders published by the Ministry of Law, with effect from 1 October 2015, the maximum interest rate licensed moneylenders can charge is 4% each month. This holds true regardless of the debtor's income and whether the loan is secured or not. There is no limit on the maximum loan amount for secured loans. However, for unsecured loans, the maximum loan amount is merely up to 4 times of the borrower's income if the borrower's annual income is less than S$120,000. Else, there is also no cap on the maximum amount he is able to borrow. Other fees that licensed moneylenders can charge include a maximum of S$60 per month in terms of late repayment fees and a maximum of 10% of the principal amount upfront when the loan is disbursed.

We managed to speak with 30 out of 156 licensed moneylenders over the phone to discuss the terms and conditions of obtaining a loan. Many licensed moneylenders were not willing to divulge information about the way they operate without speaking to the borrower in person, as they feared that the caller may be a competitor seeking to extract information in order to gain a competitive advantage in the market.

We discovered that the main requirement for a loan to be granted is for the borrower to have a stable full-time job. Other required documents include an identity card, pay slips, a billing statement that can verify the borrower's address, a bank statement, an income tax statement, a Central Provident Fund statement, a letter of employment and a valid SingPass username and password that can be used to access the borrower's financial history. Additional documents such as a passport and a work pass are needed for foreigners. These required documents can vary across moneylenders. All licensed moneylenders only make contracts in person. Unlicensed moneylenders may require similar documents, including photos of borrowers with their residence in view as collateral but offer the added advantage of fuss-free online transactions, i.e., Tan (2017c) and The Straits Times (2017).

From our phone interviews, 17 of the licensed moneylenders charge a monthly interest rate of 4%, 8 of them charge 3.92% and 3 of them charge 3.9%, while the rest quote a range of 1-4% depending on the profile of the borrower. Two licensed moneylenders mentioned that the standard interest rate across the industry is 4%. Given these datapoints, the interest rate of licensed moneylenders typically ranges from 3.90% to 4% per month, equivalent to 0.975% to 1% per week. These rates are much lower compared the rates charged by unlicensed moneylenders. As comparison, referring to Panel A of Table 3 in the manuscript, unlicensed moneylenders charged an average 6-week interest rate of 36.5% in 2015 and 2016, which is equivalent to 6.1% per week. The unlicensed moneylending interest rate is exclusive of extra charges imposed in the loan repayment process.

Licensed moneylenders also charge an upfront administrative fee of 10% of the principal amount, which is consistent across all licensed moneylenders whom we interviewed. Most charged the maximum of S$60 each month in terms of late repayment, with the late interest rate consistent with its loan interest rate. For unlicensed moneylenders, the penalty for late repayment is severe - should a borrower miss even a single payment, the borrower must restart the entire installment schedule once more, as all previous repayments would be considered void. This holds true even if the borrower was only late in repaying the final installment.

Furthermore, all licensed moneylenders do not guarantee the maximum sum

granted without a thorough assessment of each borrower's background. While a monthly income of S$3,000 permits an unsecured loan of up to 4 months' income under the Registry of Moneylenders, many are only comfortable loaning up to 1 month of basic or take-home pay. Only a handful of moneylenders were willing to loan up to twice the basic or take-home monthly income of the borrower. While most of these personal loans do not require a guarantor, the presence of a guarantor boosts the rate of loan approval and in some cases, raises the loan cap. In contrast, the average loan granted by unlicensed moneylenders to borrowers that earn S$2000-S$3000 a month shrank to S$442 in 2015 and 2016, based on Panel A of Table 3 in the manuscript.

The repayment schedule of loans from licensed moneylenders varies, and depends on whether the borrower takes out a personal loan, payday loan or an installment plan. Personal loans include various loan alternatives such as weekly, bi-weekly and monthly loan options. A typical weekly repayment plan spans 5 weeks while a typical bi-weekly repayment loan can be repaid in 2 to 4 bi-weekly payments. Monthly loans are typically 1-month loans, which are similar to payday loans, except that the latter are usually due on the day the borrower is scheduled to receive wages in the subsequent month. Lastly, installment plans typically allow borrowers to repay their loans across a maximum of 3 to 6 months, subjected to late fees and late interest charges.[42] In the unlicensed moneylending market, loans are repayable over 4 to 6 weeks on average.

We also interviewed licensed moneylenders regarding their means of enforcing repayment in the event of late repayment or default. The licensed moneylenders gave surface-level responses, such as having debt collectors appearing at the home or workplace of borrowers. Some also answered simply by warning the borrower not to take out a loan if the borrower has no intention to repay. For unlicensed moneylenders, however, the harassment that the borrower must endure is much more severe. Yusof (2015) reports instances of unlicensed moneylenders posting the information of borrowers online and making threats on social media against those unable to repay loans.

To conclude, borrowing from the licensed moneylenders is more affordable than unlicensed moneylenders. In fact, Lim (2015) reports that many turn to licensed moneylenders when they are in need of fast cash. This explains why stiffer rules on moneylending are imposed on licensed moneylenders since October 2015 in a bid to protect poorer borrowers with few alternatives and, at the same time, to preserve credit access so that borrowers will not be pushed to unlicensed moneylenders. However, Yahya (2015) writes that borrowers may still borrow from unlicensed moneylenders, as their loan requests may not be approved by legal institutions due to outstanding debts, irregular employment records or bad credit scores. In moments of pressing financial need, borrowers may also be duped by advertisements posted by unlicensed moneylenders disguised as licensed moneylenders. The findings above that we have sourced from law cases and official media are consistent with our findings from our groundwork. In our sample, all of the borrowers were aware of the existence of licensed moneylenders. However, they were unable to take out loans

[42] Some licensed moneylenders refer to installment plans as monthly loans and these loan options vary across licensed moneylenders.

from legal sources because they did not qualify for the loans, had already taken out the maximum available loans or the borrowers claimed that they had insider information that some licensed moneylenders were actually unlicensed moneylenders. It is important to note that our findings are based on the limited sample of borrowers who were interviewed during our survey work. There may exist outliers with observations that are inconsistent with ours.

A.6 Singapore Police Force Officer Interview

One of our research assistants went to the Nanyang Police Post on 11th January 2018 to find out more about the workings of the unlicensed moneylending market. She managed to speak to an officer who is the second overall in-charge of unlicensed moneylending in the Jurong division. Due to confidentiality and security purposes, the officer could not reveal more when probed with more questions. Below are the answers provided during a short informal sharing session.

1. What constitute the moneylending market? Lenders and borrowers.

2. Range of interest rate that lenders charge? 20% - 50% but can vary depending on how desperate the borrower is.

3. Can borrowers negotiate with lenders on the financial penalty when they are unable to meet their payment on time? In the initial phase before the loan is secured, lenders are often very nice to borrowers. However, once the deal is clinched, there is no negotiation. For each repayment loan, borrowers are required to pay at a specific time and date. For example, if a borrower was required to pay at 7:00pm but made a payment at 7:01pm instead, the loan repayment is considered late. Borrowers are often the ones who will approach lenders first.

A.7 China, Malaysia and Vietnam's Unlicensed Moneylending Markets

To deliver insights applicable to the unlicensed moneylending markets in more countries, in this subsection we discuss the similarities that Singapore's unlicensed moneylending market shares with China, Malaysia and Vietnam. We conducted some fieldwork by interviewing twenty borrowers in China, five borrowers in Malaysia and one borrower in Vietnam. However, because the sample size of borrowers is too small, we also exhausted many avenues to find formal academic and media sources to verify whether unlicensed moneylending markets across Asia share similarities. Specifically, we hired two research assistants for a month who spent a total of 100 hours trawling media reports and libraries for information about the unlicensed moneylending markets in China, Vietnam and Malaysia. We also contacted the local authorities in these countries, with little success.

Thus, while the evidence provided in this subsection is scant and incomplete, we wish to demonstrate that there are at the very least some signals showing that China, Vietnam and Malaysia's unlicensed moneylending markets are similar to Singapore's market. More empirical data collection is certainly required, and we hope the information shared will inspire more original research in this area.

According to market insiders, these Asian markets share similarities because these markets are dominated by the same transnational syndicates headquartered in China. In essence, the transnational syndicates are like illegal venture capital firms. They begin by recruiting individuals with high potential of being successful lenders or "entrepreneurs". "Potential" is evaluated based on qualities stated on a list given by the syndicates. The syndicates then provide the startup capital and necessary advice - for example, how to determine appropriate penalties for loan defaulters and how to advertise - for individuals to become independent unlicensed moneylenders in return for monetary compensation. These transnational syndicates do not take equity in each lender's business. Each lender is completely responsible for his or her own business and makes all decisions independent from the syndicates. Rather, the syndicates make a profit by instructing the lenders to repay the capital with interest. These transnational syndicates replicate this same operating model to many countries and fund a large number of lenders in these countries.

We draw examples of similarities between China, Malaysia and Vietnam. First, China and Singapore's unlicensed moneylending markets share numerous similarities based on our interviews with twenty borrowers who have taken illegal loans in Shanghai to gamble. In China, suppose a borrower wants to take out a loan of RMB100,000 from an unlicensed moneylender. Similar to a Singaporean lender, the Chinese lender will do some basic due diligence to ensure that he verifies the borrower's identity. He then proceeds to inform the borrower that the interest rate is 30% over a repayment period of four weeks. Apart from this information, the lender will provide no other terms, conditions or information. The RMB100,000 is handed over to the borrower by the lender. The borrower then returns RMB30,000 to the lender on the spot. The borrower has another three weeks to pay off the remaining RMB100,000. Similar to the Singaporean lender, the Chinese lender can unilaterally change the interest rate at any point in time. If the borrower disagrees with the new interest rate set by the lender, the lender will harass the borrower using verbal and physical violence similar to those used by the Singaporean lender. If the borrower delays in paying any installment, the Chinese lender will also unilaterally impose a penalty and use harassment acts to force the borrower into compliance.[43]

Second, Singapore and Malaysia's unlicensed moneylending markets also share many similarities. According to The Star Online (2015) media reports, there are many independent unlicensed moneylenders operating in Malaysia's unlicensed moneylending market. Abdullah and Hanira (2007) and Consumer Association of Penang (n.d.) report that Malaysian lenders also attract habitual gamblers who are unable

[43]Media reports also corroborate these first-hand interviews. Zhang (2016) states that similar to Singapore, China has an unlicensed moneylending market that is sustained by many independent unlicensed moneylenders. Furthermore, according to ChinTell Limited (2016), Chinese lenders often attract borrowers who are unable to obtain loans from the formal lending sector. Additionally, based on findings by Zhang and Li (2016), Chinese unlicensed moneylenders also do not state all the terms and conditions of the loans upfront. Both countries' syndicates adopt similar strategies to harass and pressure debtors into repaying their loans. Mediacorp News Group (2016) has highlighted that in China, examples of these harassment tactics include phone calls, text messages and demanding payment at the borrowers' homes. Zhang (2016) also confirms that as documented in Singapore's market, Chinese borrowers may also be forced to become runners for lenders in the event of default.

to obtain credit from legal sources to fund their gambling habits. As negotiations are usually conducted via phone or social media platforms, illegal loan agreements in Malaysia usually involve verbal contracts instead of formal written contracts. In the case of default, Malaysian lenders will also take similar actions to harass the debtors into repaying their loans (Benjamin, 2016). Benjamin (2016) also cites an example which involved locking the gates of borrowers' residences and leaving threatening notes. Furthermore, Ho (2009) observes that as in Singapore, borrowers in Malaysia may be forced to settle loan payments by becoming runners for the unlicensed moneylenders. Last, the first author asked a Singaporean ex-offender who claimed to know many borrowers in Malaysia's unlicensed moneylending market to interview five Malaysian borrowers. These Malaysian borrowers explained the process of how a lender and a borrower interact in the unlicensed moneylending market in Malaysia, which is essentially the same as in Singapore.

Finally, Vietnam's unlicensed moneylending market also shares similar features with Singapore's unlicensed moneylending market. Thanh Nien News (2010) reports that Vietnam's unlicensed moneylending market is supported by independent unlicensed moneylenders. According to Tuoi Tre News (2016), at the initial stage of loan negotiations, both countries' unlicensed moneylenders will request for the borrowers' particulars and conduct background checks before making loan decisions. In the case of default, both Vietnamese and Singaporean unlicensed moneylenders will employ violence and threats to force the borrowers into repaying their debts. For instance, Thanh Nien News (2014) states that unlicensed moneylenders in Vietnam may engage in actions such as hurling jars of wet paint on the walls of borrowers' homes, harassing borrowers' neighbours and locking borrowers' doors from the outside using a strong lock. One Vietnamese borrower explained the process of how a lender and a borrower interact in the unlicensed moneylending market in Vietnam, which is also the same as in Singapore.

B Laws and Enforcement

In this section we provide an overview of laws and enforcement effort that aim to clamp down on unlicensed moneylending activities in Singapore.

B.1 Laws and Court Cases

This subsection aims to accomplish two goals. First, we document the theoretical laws and corresponding punishments that pertain to committing harassment acts against borrowers. Second, we detail the actual punishments meted out by the courts against unlicensed moneylenders who committed unlawful harassment acts against borrowers.

Furthermore, it is important to note that most of the court cases we have found state the total punishments meted out by the courts for the entire plethora of crimes committed by the accused, which usually include other crimes in addition to harassment acts. As such, it may be challenging to understand the punishments levied specifically for committing harassment acts. Thus, we have highlighted some cases

where details about the punishment relating to each harassment act committed by the accused were made publicly available below.

Table A2: **Summary of Moneylenders Act (Revised Edition 1985)**

	Crime	**Punishment**
(1)	Any moneylender who, personally or by any person acting on his behalf, harasses or intimidates his debtor, any member of the debtor's family or any other person in connection with the loan to the debtor at, or watches or besets, the residence or place of business or employment of the debtor, the member of the debtor's family or that other person, or any place at which the debtor receives his wages or any other sum periodically due to him.	Liable on conviction to: 1. A fine of not less than $2,000 and not more than $20,000. 2. Imprisonment for a term not exceeding 12 months or both. 3. Offender being a company shall be liable to a fine of not less than $4,000 and not more than $40,000.
(2)	Any person who, acting on behalf of a moneylender, commits or attempts to commit any of the acts specified in subsection (1) shall be guilty of an offence.	Liable on conviction to: 1. A fine of not less than $2,000 and not more than $20,000. 2. Or, imprisonment for a term not exceeding 12 months or both.
(3)	Subject to section 231 of the Criminal Procedure Code, if any person, while committing any offence under section (1) or (2), causes hurt to another person, he shall also, on conviction under subsection (1) or (2).	Liable to be punished with canning with not more than 6 strokes.

However, in recent years, there were several amendments to the laws overseeing harassment acts. Unlike the 1985 revised edition, the new revised edition that was released in 2010 includes a more detailed explanation and breakdown of punishments. In addition, new punishments relating to the damage of property, hurt imposed on debtors or both were meted out. The following table is a summary of the 2010 revised edition of the Moneylenders Act (Chapter 188).

Table A3: **Summary of Moneylenders Act (Revised Edition 2010)**

	Crime	Punishment
(1)	Unlicensed moneylender: (a) Display or use threatening, abusive or insulting words, behavior, writing, sign or visible representation; or (b) Commits any act likely to cause alarm or annoyance to his borrower or surety, any member of the family of borrower or surety, or any other person, in connection with the loan to the borrower, whether or not the unlicensed moneylender does the act personally or by any person acting on behalf of him.	(i) Unlicensed moneylender is a body of corporate, shall be liable on conviction to a fine or not less than $10,000 and not more than $100,000; (ii) In any other case: (A) shall on conviction be punished with imprisonment for a term not exceeding 5 years and shall also be liable to a fine of not less than $5,000 and not more than $50,000; and (B) in the case of a second or subsequent offence, shall on conviction be punished with imprisonment for a term of not less than 2 years and not more than 9 years and shall also be liable to a fine of not less than $6,000 and not more than $60,000.
(2)	Any person who, acting on behalf of an unlicensed moneylender, commits or attempts to commit any of the acts specified in (1) shall be guilty of an offence.	(a) Be punished with imprisonment for a term not exceeding 5 years and be liable to a fine of not less than $5,000 and not more than $50,000; (b) In the case of a second or subsequent offence, shall on conviction be punished with imprisonment for a term not less than 2 years and not more than 9 years and shall also be liable to a fine of not less than $6,000 and not more than $60,000.
3(a)	Subject to sections 325(1) and 330(1) of the Criminal Procedure Code 2010, except as provided in paragraph (b), a person who is convicted first time of an offence under (1) or (2).	Punished with not more than 6 strokes of the cane.
3(b)	(i) A person who is convicted for the first time of an offence under (1) or (2) and damage was caused to any property.	Punished with not less than 3 strokes, and not more than 6 strokes of the cane.
	(ii) A person who is convicted for the first time of an offence under (1) or (2) and hurt was caused to another person.	Punished with not less than 5 strokes, and not more than 8 strokes of the cane.
	(iii) A person who is convicted for the first time of an offence under subsection (1) or (2) where hurt was caused to another person and damage was caused to any property.	Punished with not less than 6 strokes, and not more than 12 strokes of the cane.
(c)	Offenders convicted for the second or subsequent offence under (1) and (2).	Punished with not more than 12 strokes of the cane.

(d)	(i) A person who is convicted for the second time of an offence under (1) or (2) and damage was caused to any property.	Punished with not less than 5 strokes, and not more than 10 strokes of the cane.
	(ii) A person who is convicted for the second time of an offence under (1) or (2) and hurt was caused to another person.	Punished with not less than 6 strokes, and not more than 12 strokes of the cane.
	(iii) A person who is convicted for the second time of an offence under (1) or (2) where hurt to another person and damage was caused to any property.	Punished with not less than 9 strokes, and not more than 18 strokes of the cane.
(4)	(a) Subject to section 231 of the Criminal Procedure Code (Cap. 68), any person above the age of 21 who causes or procures any person below the age of 16 years to commit an offence under section (1).	Punished with imprisonment for a term not exceeding 7 years and shall also be liable to a fine of not less than $30,000 and not more than $300,000.
	(b) Subject to section 231 of the Criminal Procedure Code (Cap. 68), any person above the age of 21 who causes or procures any person below the age of 16 years to commit an offence or if: (i) Provides instruction to carry out any acts indicated in (1); (ii) Provides or makes transportation arrangements for another person for carrying out acts in (1); (iii) Acts as an arranged lookout for a person carrying out any acts knowing/having reasonable cause to believe that such acts have connections with such a demand; or (iv) Arranges or provides transport to a person for the purpose of his acting as a lookout for a person carrying out such acts.	Punished with imprisonment for a term of not less than 2 years and not more than 9 years and a fine of not more than $60,000.
	(c) In any other case, which does not fall in 4(a) and (b).	Fine not exceeding $30,000 or to imprisonment for a term not exceeding 12 months or both.
(5)	(a) A person is convicted of an offence under (1) and procures any person below the age of 16 years to commit an offence by operating as an unlicensed moneylender.	Punished with not more than 12 strokes of the cane.
	(b)A person is convicted of an offence under (1) and procures any person below the age of 16 years to commit an offence under section (4).	Punished with not more than 12 strokes of the cane.

To illustrate how the law is effected in practice, the following are some concluded court cases pertaining to harassment acts committed by unlicensed moneylender runners between 2010 and 2017. Guided by the Moneylenders Act, the court passed judgements according to the severity of the various offences.

Table A4: **Example of Court Judgments**

Year	Defendant	Crime	Punishment
2017	Ong Jun Long[44] (22-year-old)	Charged with damaging property on two separate occasions by vandalizing the walls near the targeted unit with confrontational messages on behalf of an unlicensed moneylender.	11 months' imprisonment and 3 strokes of the cane for each case.
		Charged with harassment by locking the main gate of the targeted unit with a green bicycle lock and leaving confrontational messages on the targeted unit.	9 months' imprisonment.
	Goh Yan Jun (Co-Accused, 29-year-old)	Charged with damaging property on two separate occasions by vandalizing the walls near the targeted unit with confrontational messages on behalf of an unlicensed moneylender.	12 months' imprisonment and 3 strokes of the cane for each charge.
		Charged with harassment by locking the main gate of the targeted unit with a green bicycle lock and leaving confrontational messages on the targeted unit.	38 weeks' imprisonment.
2015	Mohammad Nasir Bin Jamil[45] (34-year-old)	Second conviction for harassing debtors on behalf of an unlicensed moneylender. 5 charges of harassment on behalf unlicensed moneylenders by splashing paint and writing confrontational messages on the public wall near targeted units.	2 years' imprisonment and 5 strokes of the cane for each harassment charge.
		1 charge of public harassment by splashing red paint on the gate of the targeted unit's neighbour and vandalizing walls with confrontational messages.	2.5 years' imprisonment and 5 strokes of the cane.
		Neighbuor and vandalizing walls with confrontational messages.	

[44]Public Prosecutor v Ong Jun Long [2017] SGD 113
[45]Public Prosecutor v Mohammad Nasir Bin Jamil [2015] SGD 261

Year	Defendant	Crime	Punishment
2014	Kor Ling Ling, Judy[46] (34-year-old)	17 charges of harassment conducted by locking up the main gate of the targeted units using a bicycle lock and leaving threatening notes for the debtors. Of the 2 charges, the accused splashed pink and black paint on two targeted units.	12 months' imprisonment for each harassment charge.
		4 charges of harassment on behalf of unlicensed moneylenders by splashing paint and leaving confrontational messages on the walls of the lift landing of the targeted unit's level.	15 months' imprisonment for each harassment charge.
		Assisted in unlicensed moneylending business by engaging in electronic transactions such as funds transfers, checking account and cash withdrawals.	3 months' imprisonment and a fine of $30,000. A default of 1 month imprisonment if accused cannot pay the fine.
		Consumption of Methamphetamine.	12 months' imprisonment.
2014	Ng Wei Qiang, Johnathan[47] (24-year-old)	6 charges of harassment with arson by pouring turpentine over the newspapers and setting the newspapers on fire. In some situations, he would place newspapers inside a cardboard box, pour turpentine in the box and set fire to it. The accused also vandalised the walls of lift landings and staircase with confrontational messages at the targeted unit.	Sentenced to 18 months' imprisonment and 3 strokes of the cane for each of the 6 harassment charges.
		Assisted in unlicensed moneylending business by facilitating electronic transactions, deposits and withdrawals despite knowing the identity of the unlicensed moneylenders.	3 months' imprisonment and a fine of $30,000. A default of 1 month imprisonment if accused cannot pay the fine.

[46]Public Prosecutor v Kor Ling Ling, Judy [2014] SGDC 152
[47]Public Prosecutor v Ng Wei Qiang, Johnathan [2014] SGDC 111

2013	Tan Boon Leong Eric[48]	3 charges of harassment on behalf of an unlicensed moneylender by vandalizing and damaging the walls with confrontational messages using indelible ink A total of 16 residents were harassed over a period of five months.	Sentenced to 18 months' imprisonment and 3 strokes of the cane for each charge.
		1 charge of assisting unlicensed moneylending activity through his own bank account.	1 month's imprisonment and a fine of $30,000. A default of 1 month imprisonment if accused cannot pay the fine.
2013	Goh Peng Chai[49]	10 charges of assisting unlicensed moneylenders through printing name cards and flyers.	1 month's imprisonment and a fine of $30,000. A default of 1 month imprisonment if accused cannot pay the fine.
2013	Ng Teng Yi Melvin[50] (23-year-old)	1 charge of harassment by splashing red paint on the targeted unit and spraying graffiti on the staircase landing wall.	Sentenced to 4 months' imprisonment and a fine of $30,000 (in default of 4 weeks' imprisonment).
2012	Ong Chee Eng[51] (44-year-old)	5 charges of harassment through arson.	Sentenced to 24 months' imprisonment and 3 strokes of the cane for each charge.
		3 charges of harassment by locking the victims' doors with bicycle locks.	Sentenced to 15 months' imprisonment and 3 strokes of the cane for each charge.
		15 charges of harassment by splashing paint outside targeted units.	Sentenced to 12 months' imprisonment and 3 strokes of the cane for each charge.
		Assisting in unlicensed moneylending activity by distributing name cards of an unlicensed moneylender.	Sentenced to 1 month's imprisonment and a fine of $30,000.
2011	Mohammad Suhairi Bin Mail[52] (29-year-old)	3 separate cases of harassing a debtor's neighbour.	For each case, 14 months' imprisonment and 3 strokes of the cane.
		Securing the main gate of the debtor's unit with a bicycle lock.	14 months' imprisonment and three strokes of the cane.

[48]Public Prosecutor v Tan Boon Leong Eric [2013] SGDC 25
[49]Public Prosecutor v Goh Peng Chai [2013] SGDC 199
[50]Public Prosecutor v Ng Teng Yi Melvin [2013] SGDC 207
[51]Public Prosecutor v Ong Chee Eng [2012] 3 SLR776
[52]Public Prosecutor v Mohammad Suhairi Bin Mail [2011] SGDC 31

		2 separate cases on harassing the debtor's unit.	For each case, 12 months' of imprisonment and 3 strokes of the cane.
		Assisting unlicensed moneylending activities.	3 months' imprisonment and a fine of $30,000 (in default of 3 months' imprisonment).
2011	Ho Yong Jie[53] (26-year-old)	2 separate cases of harassing debtors on behalf of unlicensed moneylenders by causing damage to property belonging to residents unrelated to debtors with an accomplice.	12 months' imprisonment and the mandatory minimum of 3 strokes of the cane for each case.
2010	Nur Azilah Bte Ithnin[54] (16-year-old)	3 charges of 3 separate incidents where the defendant wrote statements on the staircase leading to the targeted housing unit and splashed paint on the doors of the units.	Sentenced to 9 months' imprisonment for all 3 charges.
		3 charges of 3 separate incidents where the defendant splashed thinner on the doors of targeted units and set them on fire.	Charged with committing mischief by fire with intention of causing damage to property Sentenced to 26 months' imprisonment for all 3 charges.
		Final charge where the defendant splashed thinner on the clothes hung along the corridor and the shoe rack placed outside the targeted unit.	Charged with attempting to commit mischief by fire with intention of causing damage to property. Sentenced to 13 months' imprisonment.
2010	Yeo Pe Keat[55]	For the first 5 charges, the defendant performed electronic transfers, withdrew and deposited monies for the unlicensed moneylending business.	Sentenced to 3 months' imprisonment for each charge. A mandatory minimum fine of $30,000 (in default of 3 months' imprisonment).
		Final charge of allowing his bank account to be used for the unlicensed moneylending business.	Defendant was ordered to serve a total sentence of 6 months and a fine of $180,000. As the defendant was unable to pay the fine, a total default sentence of 18 months' imprisonment was ruled instead.

[53]Public Prosecutor v Ho Yong Jie [2011] SGDC 78
[54]Public Prosecutor v Nur Azilah Bte Ithnin [2010] 4 SLR731
[55]Public Prosecutor v Yeo Pe Keat [2010] SGDC 255

B.2 Government Policy Timeline

Table A5: **Policy Timeline**

Time	Event
2009	According to Sim (2013), the Housing Development Board (HDB) installed CCTVs in the Bukit Panjang carparks.
11 Feb 2010	A report by Ministry of Finance Singapore (2013) states that amendments were made in "Moneylenders Act" to tighten the law against illegal moneylending activities.
Aug 2010	According to Singapore Police Force (2012), the National Crime Prevention Council (NCPC) set up the 1800-X-Ah-Long (1800-9-24-5664) Hotline to receive more information on illegal moneylending activities.
Before Jun 2011	Safe Trolley (n.d.a) states that Bukit Batok, Jurong West Chua Chu Kang, Woodlands, Marsiling and Bukit Panjang (districts in Singapore) have CCTV systems installed.
2012	Accordding to Singapore Police Force (2012), through collaborations with the grassroots community, close to 3,800 Neighbourhood Watch Groups have been formed to keep watch over residential neighbourboods.
Before 20 Apr 2012	Safe Trolley (n.d.b) states that Jalan Bukit Merah (a district in Singapore) has a CCTV system installed.
Before Aug 2012	According to a report published in Asian One (2012), Jalan Kayu (a district in Singapore) has a CCTV system installed.
Sep-Nov 2012	According to a report by Gdy2shoez (2012), Bukit Panjang, Pasir Ris, West Coast, Hong Kah and Sembawang (districts in Singapore) have CCTV systems installed.
30 Nov 2012	Kalyani (2012) states that Singapopre Police Force (SPF) and the National Crime Prevention Council (NCPC) launched the inaugural Anti-Unlicensed Moneylending Public Education and Awareness Campaign.
	Kalyani (2012) also states that SPF and NCPC launched Anti-Unlicensed Moneylending (AUML) television commercials.
	Kalyani (2012) also states that SPF and NCPC launched Anti-Unlicensed Moneylending-themed exhibitions.
	Kalyani (2012) also states that More roadshows including talks conducted at Secondary Schools and localised Community Safety and Security Programmes (CSSP) were conducted by SPF and NAPC around Singapore.
	Kalyani (2012) also states that SPF and NCPC set up the Anti-Ulicensed Moneylending webpage.
End of 2012	According to Parliament of Singapore (2013), the Citizens on Patrol (COP) scheme has steadily grown to over 700 COP groups with more than 14,000 members island-wide.
	According to Singapore Police Force (2015), increased community collaboration saw a 29% increase in the number of COP members at the pilot areas.
2013	According to Singapore Police Force (2013), 6 more Neighbourhood Police Centres (NPC) were established.
Mar 2013	Sim (2013) states that CCTV systems were installed in Bedok, Toa Payoh and Sengkang (districts in Singapore).
Nov 2014	According to Singapore Police Force (2014), SPF and NCPC rolled out the 2nd nationwide Anti-Unlicensed Moneylending (AUML) Public Education and Awareness Campaign.
Jan 2015	Admin (2015) states that a CCTV system was installed in Sengkang (a district in Singapore).
30 Jan 2015	According to Singapore Police Force (2014), frontline police officers from the Bukit Merah West Neighbourhood Police Centres were equipped with Body-Worn Cameras (BWC).
By Jun 2015	According to Singapore Police Force (2014), another 6 Neighbourhood Police Centres (NPC) equipped Body-Worn Cameras (BWC): Ang Mo Kio North NPC, Ang Mo Kio Police Division, Bedok South NPC, Bedok Police Division, Bukit Merah East NPC, Central Police Division, Jurong West NPC, Jurong Police Division, Toa Payoh NPC, Tanglin Police Division.
Jul 2015	Admin (2015) states that a HDB flat in Sengkang area installed CCTV system.
Mar 2016	Heng (2016) states that over 52,000 police cameras have been installed in 8,600 blocks.
2016	According to The Straits Times (2016) and Safe Trolley (n.d.a), all 10,000 blocks and carparks under the Police Cameras (PolCams) 1.0 initiative, which was first rolled out in April 2012, are now equipped with the cameras.

B.3 Enforcement

This subsection contains quotes from Singapore government officials about the effectiveness of enforcement efforts by the authorities as well as how the unlicensed

moneylending market was affected.

Singaporean politicians tout the effectiveness of the enforcement efforts against the unlicensed moneylending market such as the CCTV installation initiative by providing anecdotal evidence.[56] We provide three examples. First, Heng (2016) writes that Member of Parliament Gan Thiam Poh said: "I do notice that there are improvements, especially in the cases of loan shark harassment that used to be quite common." Second, Heng (2016) also writes that Member of Parliament Sitoh Yih Pin used to get loan shark harassment cases at his Meet-the-People Sessions every month, before cameras were installed. Now Sitoh Yih Pin claims that he has not "got any for quite a while." Last, according to Member of Parliament Iswaran (2013), "Police have seen an improvement in the lender harassment situation at the blocks where Police Cameras were deployed. This is in the context of an overall decrease in cases of unlicensed moneylending and harassment. The footages received and retrieved from the Police Cameras have also helped solve nine crime cases and provided further leads for investigations in another 61 cases."

The Annual Crime Brief of Singapore Police Force (2015) states that "The number of unlicensed moneylending harassment cases with property damage reported at 2,152 blocks with Police Cameras decreased by 1,191 cases (-73.7%) from the pre-Police Cameras period of 1,617 cases in 2013 to 426 cases in 2015. Compared to 2014, this represents a decrease of 925 cases (-68.5%), from 1,351 cases." The Brief notes that the 2,152 blocks refer to the high unlicensed moneylending incidence blocks, and not randomly selected blocks. The Brief also highlights the Citizens on Patrol (COP) scheme, which has steadily grown over the years to over 700 COP groups with more than 14,000 members island-wide. These COP groups help augment police presence by being the "eyes and ears" for the police during their patrols. The Brief attributes the success of reducing unlicensed moneylending related crimes to tough enforcement efforts, community partnerships, public education and strict laws. In particular, it claims that the two main contributors of the success in reducing unlicensed moneylending crimes were due to the installation of Police Cameras in HDB blocks and the community's active participation in the neighbourhood watch groups.

Next, interviews conducted by us and our enumerators find that there were changes in loan terms before and after these enforcement efforts. Before the increase in enforcement, a loan of S$1,000 would typically mature in six weeks. A guarantor needs to be physically present when the borrower meets the lender, and has to verbally agree to repay the loan if the borrower defaults. Once the loan is disbursed, the borrower repays S$200 each week and the first payment is due on the same day that the loan is made. For example, if the loan is made on January 1, the borrower receives S$800 dollars on this day, and needs to repay S$200 on January 8, 15, 22, 29 and February 5.[57] Typically, it is possible to obtain a loan amounting to thousands

[56] According to The Straits Times (2016), approximately 80% of Singapore's resident population live in HDB blocks. During 2013-2015, more than 52,000 CCTVs were installed in 8,600 HDB blocks. In 2016, the number of CCTVs expanded to all 10,000 blocks and carparks are now also under the PolCam 1.0 initiative.

[57] According to Tan (2009) and Gopal (2012), this market practice is also prevalent in the unlicensed moneylending markets of Hong Kong and Malaysia.

of dollars.

Over the years, following the increase in enforcement, a loan of S$1,000 would typically mature in four weeks. A guarantor is no longer necessary. The borrower needs to repay S$300 on the same day that the loan is made. Starting from the second week onwards, the borrower then repays S$150 every three or four days (effectively twice a week). The amount of money lenders would be willing to loan to borrowers decreased significantly to no more than S$1,000 on average. Interviewees stated that after enforcement, it became very difficult to find lenders, because lenders were either arrested or in hiding. Even if a borrower managed to find a lender, the lender would only be willing to lend very small amounts of money. In addition, lenders became very cautious, and preferred asking existing customers to refer their friends. For each referral, lenders would pay the person a referral fee of S$50. Lastly, borrowers complained that lenders began treating borrowers extremely unreasonably by trying to charge large sums of money from borrowers, including those who have been borrowing from them consistently.

C Model and Proofs

This section provides a complete characterization of the model.

C.1 Characterization of the Model

We first start by characterizing the decision problems faced by the borrower and the lender, and defining the market equilibrium. After that, we derive the market equilibrium and some comparative static results of the model.

We begin by considering a borrower's decision problem. Let $F(e)$ denote the distribution of markups chosen by lenders in the market. It follows directly from our assumptions that it is never optimal for a lender to charge any markup strictly higher than $\overline{e}$. Therefore, we restrict our attention to distributions with support $[0, \overline{e}]$.

Let V_0 and $V(e)$ be the borrower's value functions in the unmatched and matched states, respectively, where e in $V(e)$ indicates the markup charged by the borrower's regular lender. Taking the distribution F as exogenous, the value functions are given by

$$V_0 = \gamma(u + \int_0^{\overline{e}} (-e + \delta\beta max\{V_0, V(e)\})dF(e) + (1-\delta)\beta V_0) + (1-\gamma)\beta V_0$$

and

$$\begin{aligned} V(e) &= \theta(u - e + \delta\beta V(e)) + (1-\theta)[\gamma(u + \int_0^{\overline{e}} (-e' + \delta\beta max\{V(e), V(e')\})dF(e')) \\ &\quad +(1-\gamma)\delta\beta V(e)] + (1-\delta)\beta V_0 \end{aligned}$$

Consider the value function V_0. When the borrower is unmatched, she finds a lender at random with probability γ. In this case, the borrower enjoys immediate payoff u from obtaining a loan, and the lender charges e from the borrower during

the loan repayment process, where e is drawn randomly from the distribution F. After the loan transaction, the borrower decides whether to form a match with this lender or remain unmatched. The continuation payoff $max\{V_0, V(e)\}$ captures this decision. However, any match is exogenously terminated with probability $1-\delta$, after which the borrower is unmatched and only has continuation payoff V_0. Lastly, the borrower fails to find a lender with probability $1-\gamma$, and therefore enjoys no payoff in the current period and also has continuation payoff V_0.

Now consider the value function $V(e)$. With probability θ, the borrower's regular lender is available. In this case the borrower continues to borrow from this regular lender, the lender charges e from the borrower, an amount that is already known to the borrower. With probability $1-\theta$, the borrower's regular lender is temporarily unavailable. In this case the borrower has to search for a new lender in the market. The main difference from the previous case in which the borrower is unmatched is that if a loan transaction occurs between the borrower and a new lender, the borrower must decide whether to continue with this new lender or to return to her original regular lender. The continuation payoff $max\{V(e), V(e')\}$ captures this decision, in which e' is the markup chosen by the new lender. With probability $1-\gamma$, the borrower fails to find a new lender in the market, so she can only return to her regular lender with continuation payoff $V(e)$. Lastly, any match is exogenously terminated with probability $1-\delta$.

Note that V_0 is constant while $V(e)$ strictly decreases in e. Hence, there is a unique cutoff of markup, denoted as e^*, such that an unmatched borrower decides to match with a new lender if and only if the latter charges a markup $e \leq e^*$. Explicitly, by checking whether condition $V(e^*) = V_0$ holds on the support $[0, \overline{e}]$, e^* is given by

$$\begin{array}{ll} e^* = (1-\gamma)u + \gamma \int_0^{\overline{e}} e dF(e) - \theta\gamma\delta\beta \int_0^{e^*} \frac{F(e)}{1-\delta\beta+(1-\theta)\gamma\delta\beta F(e)} de & \text{if} \quad V(e^*) = V_0 \\ e^* = \overline{e} & \text{if} \quad V(\overline{e}) \geq V_0 \end{array} \tag{5}$$

Meanwhile, a matched borrower decides to continue with a new lender if and only if the latter charges a markup less than her original regular lender. A borrower's matching strategy is fully described by these conditions.

Next, a lender's decision problem is to maximise his lifetime payoff by choosing the optimal markup e to charge on all loan transactions. In the steady state that we consider, the lender's lifetime payoff, denoted as $U(e)$, has a stationary structure as

$$U(e) = \pi(e) + \beta U(e)$$

where $\pi(e) = v(e)b(e)$ is his steady state profit in each period. Note that the lender's steady state profit is the product of the amount of loans $b(e)$ he lends out in each period and the profit $v(e)$ he earns from each loan. In the steady state, maximizing the lifetime payoff $U(e)$ is equivalent to maximizing the steady state profit $\pi(e)$.

Now we look for steady state market equilibrium in which the matching strategy of borrowers and the distribution of markups chosen by lenders are both time invariant. Note that in the steady state, if a level of markup e generates strictly higher profit than another level of markup e', then no lender should choose to charge e'. This implies that in the market equilibrium, markups that are chosen by lenders

should generate the same steady state profit. More precisely, given an equilibrium distribution F, steady state profit $\pi(e)$ should satisfy

$$\left\{ \begin{array}{lll} \pi(e) = \overline{\pi} & \text{if} & e \in supp(F) \\ \pi(e) \leq \overline{\pi} & \text{if} & e \notin supp(F) \end{array} \right\} \tag{6}$$

where $\overline{\pi} > 0$.

A formal definition of the market equilibrium is given as follows.

Definition. *A steady state market equilibrium consists of a cutoff e^* and a distribution F of markups such that: (a) given the distribution F, the cutoff e^* satisfies Condition (1); (b) given the cutoff e^*, the distribution F satisfies Condition (2).*

In the steady state, a lender's loan transactions $b(e)$ can be divided into two parts: loans that are taken out by regular borrowers who have formed matches with him before, denoted as $b_R(e)$, and loans that are taken out by new borrowers who are transacting with him for the first time, denoted as b_N. Because search in the market is random, b_N is the same for all lenders. However, in equilibrium, $b_R(e)$ decreases in e, and the decrease is strict when $e \leq e^*$. Intuitively, if a lender charges a smaller markup, he can poach more borrowers from other lenders while simultaneously decreasing borrower attrition. Therefore, the total loans $b(e)$ also decreases in e. On the other hand, the profit that a lender earns from each loan, $v(e)$, increases in $e \in [0, \overline{e}]$. Condition (2) states that in equilibrium, a lender who charges less and has more borrowers will earn the same profit as a lender who charges more and has fewer borrowers.

Now we are ready to derive the market equilibrium. To take into account the possibility that a positive measure of lenders choose the same markup, we let $p(e)$ denote the mass probability of the distribution F on e.

Proposition 1: Market equilibrium of this model exists and is unique. In equilibrium, the distribution F of markups is non-degenerate, and there exists parameter values such that F exhibits a mass point on $\overline{e}$.

Proof: See Supplementary Appendix Section C.2.

Borrowers have to search for and transact with lenders individually. Due to search frictions, there is no single level of markup that clears the market, meaning that the distribution F of markups must be non-degenerate in equilibrium. Suppose that, by contradiction, all lenders charge the same markup e in equilibrium. When their regular lenders are temporarily unavailable in the current period, even matched borrowers need to search for new lenders in the market. If a lender deviates by charging a markup that is slightly lower than e, he will be able to retain all his regular borrowers, as well as all new borrowers, including those who were previously matched with other lenders. Thus, this lender attracts a discrete increase in terms of the number of borrowers from this deviation. Meanwhile, the loss of profit per transaction from the deviation is negligible. As a result, the deviation is profitable for this lender. Thus, in equilibrium, the market must exhibit a dispersion of markups.

Moreover, a positive measure of lenders may charge the same markup $\overline{e}$ in equilibrium, resulting in a mass probability of the distribution F. Intuitively, if a borrower does not place high value on the loans from a lender, she would be less motivated to form a repeated borrowing relationship with the lender unless the lender's choice of markup is low. Expecting this, rather than trying to retain borrowers by charging small markups, some lenders choose to maximise their profit from each loan transaction by charging markup $\overline{e}$. Note that the distribution of markups that exhibits a hump over a range of values together with a mass point for some ranges of parameters would not appear in a standard Burdett and Mortensen (1998) model, which does not account for asymmetric information.

We derive some comparative static results.

Proposition 2: (1). For $\gamma \in (0,1)$, there exists a cutoff value $\overline{\gamma} \in (0,1)$, such that the average level of markup strictly decreases in γ for $\gamma \leq \overline{\gamma}$, and strictly increases in γ for $\gamma \geq \overline{\gamma}$.
(2). For $\theta \in (0,1)$, the average level of markup changes non-monotonically in θ.
(3). For $\overline{e} \in (0,u)$, the average level of markup strictly increases in $\overline{e}$.
(4). For $u \in (\overline{e}, +\infty)$, there exists cutoff values $\underline{u}$ and $\overline{u}$, where $\overline{e} \leq \underline{u} < \overline{u}$, such that the average level of markup strictly decreases in u for $u < \underline{u}$, strictly increases in u for $\underline{u} \leq u < \overline{u}$, and is constant for $u \geq \overline{u}$.
(5). Changing the measures μ and ρ of borrowers and lenders has no effect on the equilibrium distribution of markups.

Proof: See Supplementary Appendix Section C.2.

Consider Part (1). In the proof we show that $\overline{\gamma}$ is the threshold for the distribution F to exhibit a mass probability on $\overline{e}$: $p(\overline{e}) > 0$ if $\gamma > \overline{\gamma}$, and $p(\overline{e}) = 0$ if $\gamma \leq \overline{\gamma}$. Suppose originally $\gamma > \overline{\gamma}$, so borrowers can easily find new lenders to trade with. In this case, borrowers are more selective in forming matches with lenders, and therefore a positive measure of lenders will choose to transact only with new borrowers by charging the amount $\overline{e}$. If enforcement reduces γ such that it becomes more difficult for borrowers to meet new lenders, borrowers would be more willing to tolerate higher markups when deciding to form matches with lenders. So long as γ is still larger than $\overline{\gamma}$, the measure of lenders who choose the markup $\overline{e}$ declines as γ is reduced, resulting in lower average level of markup. However, if γ becomes less than $\overline{\gamma}$ such that all lenders have repeat borrowers, the average level of markup increases as γ is reduced, because lenders can now choose higher markups while still retaining the borrowers. Therefore, the average level of markup changes non-monotonically as enforcement increases.

The probability θ captures another sort of search friction in the market. We show in the proof that, if θ is either close to 0 or 1, the average level of markup in equilibrium is close to $\overline{e}$. If θ is close to 1, compared to being unmatched and having the risk of failing to find a new lender in the market, being matched and having the chance to obtain loans from the regular lender with a large certainty is preferred by a borrower. As a result, all lenders can choose markups close or equal to $\overline{e}$. On the other hand, if θ is close to 0, effectively, each borrower has to search in the market in every period, and being matched does not differ significantly from being unmatched.

Expecting this, a lender can profit greatly by choosing the markup $\overline{e}$ and by only targeting new borrowers. As a result, almost all lenders charge $\overline{e}$ and the average level of markup is also close to $\overline{e}$. However, if θ is not close to these extremes, the effect of a change in θ on a borrower's intention to form a match is more ambiguous, because the values from being matched and unmatched both increase with the ease of meeting a regular lender. In this case, the markups chosen in equilibrium are more dispersed and the average level of markup can be strictly less than $\overline{e}$. Therefore, as θ is reduced by enforcement, the average level of markup can either increase or decrease.

If enforcement lowers $\overline{e}$, lenders' ability to charge high markup is restricted, hence the average level of markup in equilibrium is reduced. Moreover, when $\overline{e}$ is high, there may be a positive measure of lenders who charge $\overline{e}$ and only do one-off transactions with new borrowers. As $\overline{e}$ is reduced, the one-off transactions become less attractive, and these lenders charge lower markups to attract repeat borrowers, which further reduces the average level of markup.

If $u \geq \overline{u}$ such that loans are highly valuable to borrowers, lenders can retain unmatched borrowers even by charging $\overline{e}$. Although there is still a dispersion of markups in equilibrium, the average level of markup is high. If u decreases in this range, the distribution of markups does not change. However, if u is in the range $[\underline{u}, \overline{u})$ such that loans are less valuable to borrowers, lenders need to lower their markups to acquire unmatched borrowers, resulting in a lower average level of markup in equilibrium. Lastly, if $u < \underline{u}$ such that loans are least valuable to borrowers, lenders have to choose very low markups to acquire unmatched borrowers. As a result, some lenders prefer to charge $\overline{e}$ and only have one-off transactions with borrowers, which causes a rise in the average level of markup. Therefore, if enforcement reduces u, for instance, by increasing the penalty when borrowers are caught gambling or abusing drugs, the average level of markup may increase.

Lastly, in the proof we show that the cutoff value e^* and the distribution F in the market equilibrium are not affected by the numbers of borrowers and lenders. Therefore, the average level of markup is independent of the number of market participants. However, each lender's steady state profit is proportional to the number of borrowers and lenders. Thus, given the measure of borrowers in this market, if there is an entry cost for each lender, then the measure of lenders who enter this market can be fully determined.

C.2 Proofs of Propositions 1 and 2

Proof of Proposition 1.

Let a denote the proportion of borrowers who are unmatched in the steady state. In the steady state, in each period, the measure of borrowers who change from the unmatched state to the matched state is $\mu a \gamma \delta F(e^*)$, while the measure of borrowers who change from the matched state to the unmatched state is $\mu(1-a)(1-\delta)$. In the steady state, these two measures equal each other, which implies that

$$\mu a \gamma \delta F(e^*) = \mu(1-a)(1-\delta) \quad \Rightarrow \quad a = \frac{1-\delta}{1-\delta+\gamma\delta F(e^*)}$$

In each period, each lender transacts with two different groups of borrowers: a group of borrowers who have not transacted with him before, and a group of borrowers who are his regular borrowers. The total measure of borrowers who are new to lenders is

$$\mu a\gamma + \mu(1-a)(1-\theta)\gamma = \mu\gamma\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)}$$

which consists of the unmatched borrowers as well as the matched borrowers whose regular lenders are temporarily unavailable.

Let b_N denote the measure of borrowers who are new to each lender in each period, then

$$b_N = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)}$$

Note that if a lender charges e from the borrowers, where $e > e^*$, then b_N is the only measure of transactions that this lender has in each period.

Let $b_R(e)$ denote the measure of transactions that a lender has with his regular borrowers, then

$$b_R(e) = \theta R(e)$$

where e is the lender's choice of markup and $R(e)$ is the measure of borrowers who are matched with him. If $e > e^*$, then $R(e) = 0$ because no borrower stays matched with this lender. Therefore we only need to consider the measure $R(e)$ with $e \leq e^*$. Let $G(e)$ denote the distribution of markups that borrowers face in the steady state conditional on being matched with lenders. Thus, at the beginning of each period, the measure of the group of borrowers who are matched with lenders whose choices of markups are in the interval $[e, e^*]$ is $\mu(1-a)(1-G(e))$. In this period, the measure of borrowers who enter this group is $\mu a\gamma\delta(F(e^*)-F(e))$. On the other hand, in this period the measure of borrowers who exit this group is $\mu(1-a)(1-G(e))[1-\delta+\gamma\delta(1-\theta)F(e)]$, including borrowers whose matches with their regular lenders are exogenously terminated and borrowers who switch their matches to new lenders with markups in the interval $[0, e)$. In the steady state, these two measures equal each other, which implies that

$$\mu a\gamma\delta(F(e^*)-F(e)) = \mu(1-a)(1-G(e))[1-\delta+\gamma\delta(1-\theta)F(e)]$$

Therefore,

$$G(e) = 1 - \frac{(1-\delta)(F(e^*)-F(e))}{F(e^*)[1-\delta+(1-\theta)\gamma\delta F(e)]}$$

for $e \in [0, e^*]$.

Conditional on being matched, the measure of borrowers who face markups in the interval $[e-\epsilon, e]$ is $\mu(1-a)(G(e)-G(e-\epsilon))$; on the other hand, the measure of lenders who choose markups in this interval is $\rho(F(e)-F(e-\epsilon))$. In the steady state, $R(e)$ is determined by

$$R(e) = \lim_{\epsilon\to 0}\frac{\mu(1-a)(G(e)-G(e-\epsilon))}{\rho(F(e)-F(e-\epsilon))} = \frac{\mu(1-a)G'(e)}{\rho F'(e)}$$

After some algebraic manipulation, we obtain

$$R(e) = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)}\frac{\delta(1-\delta)}{[1-\delta+(1-\theta)\gamma\delta F(e)]^2}$$

Let $b(e)$ denote the total measure of transactions that a lender has in each period. In the steady state, $b(e)$ is given by

$$b(e) = \left\{ \begin{array}{ll} b_N = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)} & if \quad e > e^* \\ b_N + b_R(e) = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)}(1+\frac{\theta\delta(1-\delta)}{[1-\delta+(1-\theta)\gamma\delta F(e)]^2}) & if \quad e \leq e^* \end{array} \right\}$$

Now we characterise the distribution F in the market equilibrium. The work is based on several claims.

Claim C.1. *There is a value $\underline{e} > 0$ such that any markup e chosen in equilibrium satisfies $e \geq \underline{e}$.*

To see this, note that

$$\pi(0) = v(0)b(0) = 0 < \pi(\overline{e}) = v(\overline{e})b(\overline{e})$$

That is, choosing to charge $e = 0$ only generates profit 0 for a lender, which is strictly dominated by choosing to charge $\overline{e}$. Therefore there must be a value $\underline{e} > 0$ such that any markup chosen by lenders in equilibrium is larger than this value. Together with the value $\overline{e}$, we conclude that $supp(F) \subseteq [\underline{e}, \overline{e}]$.

Claim C.2. *No markup e in the interval $(e^*, \overline{e})$ is chosen by lenders in equilibrium.*

To see this, note that $b(e) = b(\overline{e}) = b_N$ for any $e \in (e^*, \overline{e})$, which implies that

$$\pi(e) = v(e)b_N < \pi(\overline{e}) = v(\overline{e})b_N$$

Therefore choosing to charge $e \in (e^*, \overline{e})$ is strictly dominated by choosing to charge $\overline{e}$.

Claim C.3. *$F(e^*) > 0$ in equilibrium.*

Suppose not. Assume $F(e^*) = 0$, so no borrower chooses to match with any lender in equilibrium. In this equilibrium, because all lenders have the same number of new borrowers $b_N = \mu\gamma/\rho$ of transactions in each period, they must charge the same level $\overline{e}$ from borrowers. However, in this case, if a lender deviates and chooses to charge $\overline{e} - \epsilon$, which is arbitrarily close to $\overline{e}$, he should be able to retain all borrowers in the current period as his regular borrowers in future periods. The deviation increases this lender's measure of transactions in each period by a discrete amount, while reducing his profit in each transaction by only an arbitrarily small amount. Therefore the deviation is strictly profitable for the lender. A contradiction.

Claim C.4. *The distribution F has no mass point in the interval $[\underline{e}, e^*]$.*

Suppose not. Assume that there is a positive measure of lenders who choose to charge $e \in [\underline{e}, e^*]$ in equilibrium. Similar to the argument shown in the previous claim, we can show that a lender who chooses to charge $e - \epsilon$ rather than e will obtain a discrete increase in the measure of transactions in each period, while his profit loss in each transaction is negligible. Therefore there is no mass point in the interval $[\underline{e}, e^*]$.

Claim C.5. *The distribution F is continuous on the interval $[\underline{e}, e^*]$.*

Suppose not. Assume that there exist markups e_1 and e_2 in equilibrium such that $F(e_1) = F(e_2)$, where $\underline{e} \leq e_1 < e_2 \leq e^*$. This implies that $b(e_1) = b(e_2)$, and in addition

$$\pi(e_1) = v(e_1)b(e_1) < \pi(e_2) = v(e_2)b(e_2)$$

Therefore choosing to charge e_1 is strictly dominated by choosing to charge e_2, which contradicts the fact that e_1 is chosen by some lenders in equilibrium.

The previous claims imply that if the distribution F has a mass point, it can only have this mass point on $\overline{e}$. Let $p(\overline{e})$ denote the mass of probability that the lenders charge $\overline{e}$.

Claim C.6. *If $e^* = \overline{e}$, then $p(\overline{e}) = 0$. If $e^* < \overline{e}$, then $F(e^*) = 1 - p(\overline{e})$.*

To see the first part of this claim, note that if $e^* = \overline{e}$ but $p(\overline{e}) > 0$, it would contradict the previous claim that the distribution F has no mass point in the interval $[\underline{e}, e^*]$. To see the second part of the claim, note the previous claim that no markup e in the interval $(e^*, \overline{e})$ is chosen by lenders in equilibrium, hence $F(e^*) = 1 - p(\overline{e})$.

Let $\overline{e}^*$ and $\underline{e}^*$ be values determined by

$$v(\underline{e}^*) = \frac{(1-\delta)v(\overline{e})}{1-\delta+\delta\theta} \quad \textit{and} \quad v(\overline{e}^*) = \frac{(1-\delta+(1-\theta)\gamma\delta)^2 v(\overline{e})}{[1-\delta+(1-\theta)\gamma\delta]^2 + \theta\delta(1-\delta)}$$

It can be verified that $0 < \underline{e}^* < \overline{e}^* < \overline{e}$.

Claim C.7. *In equilibrium, for any $e^* \in [0, \overline{e}]$, probability $p(\overline{e})$ has the properties such that: (1) $p(\overline{e}) = 1$ if $e^* \leq \underline{e}^*$; (2) $p(\overline{e}) = 0$ if $e^* \geq \overline{e}^*$; and (3) $p(\overline{e}) \in (0, 1)$ if $e^* \in (\underline{e}^*, \overline{e}^*)$.*

Consider part (1) and suppose the opposite, so $e^* \leq \underline{e}^*$ but $p(\overline{e}) < 1$. In this equilibrium, the lender who chooses the lowest markup $\underline{e}$, where $\underline{e} < e^* \leq \underline{e}^*$, should have a payoff satisfying $\pi(\underline{e}) \geq \pi(\overline{e})$. However, note that with $F(\underline{e}) = 0$,

$$\pi(\underline{e}) = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)}\frac{\theta\delta+1-\delta}{1-\delta}v(\underline{e}) < \pi(\overline{e}) = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)}v(\overline{e})$$

which contradicts the requirement that $\pi(\underline{e}) \geq \pi(\overline{e})$. Therefore if $e^* \leq \underline{e}^*$, then $p(\overline{e}) = 1$.

Consider part (2) and suppose the opposite, so $e^* \geq \overline{e}^*$ but $p(\overline{e}) > 0$. Note the claim that if $e^* = \overline{e}$, then $p(\overline{e}) = 0$. Thus we only need to consider the case that $\overline{e} > e^* \geq \overline{e}^*$ but $p(\overline{e}) > 0$, which implies that $\pi(\overline{e}) \geq \pi(e^*)$ in equilibrium. However, note that with $F(e^*) < 1$,

$$\pi(e^*) = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)}(1+\frac{\theta\delta(1-\delta)}{[1-\delta+(1-\theta)\gamma\delta F(e^*)]^2})v(e^*) > \pi(\overline{e}) = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta F(e^*)}{1-\delta+\gamma\delta F(e^*)}v(\overline{e})$$

which contradicts the requirement that $\pi(\overline{e}) \geq \pi(e^*)$. Therefore if $e^* \geq \overline{e}^*$ then $p(\overline{e}) = 0$.

Consider part (3). First suppose that $e^* > \underline{e}^*$ but $p(\overline{e}) = 1$, which implies that $\pi(\overline{e}) \geq \pi(e^*)$ in equilibrium. However, note that with $F(e^*) = 0$,

$$\pi(e^*) = \frac{\mu\gamma}{\rho}\frac{1-\delta+\delta\theta}{1-\delta}v(e^*) > \pi(\overline{e}) = \frac{\mu\gamma}{\rho}v(\overline{e})$$

which contradicts the requirement that $\pi(\overline{e}) \geq \pi(e^*)$. Therefore, if $e^* > \underline{e}^*$, then $p(\overline{e}) < 1$.

Now suppose that $e^* < \overline{e}^*$ but $p(\overline{e}) = 0$, which implies that $\pi(\overline{e}) \leq \pi(e^*)$ is in equilibrium. However, note that with $F(e^*) = 1$,

$$\pi(e^*) = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta}{1-\delta+\gamma\delta}(1+\frac{\theta\delta(1-\delta)}{[1-\delta+(1-\theta)\gamma\delta]^2})v(e^*) < \pi(\overline{e}) = \frac{\mu\gamma}{\rho}\frac{1-\delta+(1-\theta)\gamma\delta}{1-\delta+\gamma\delta}v(\overline{e})$$

which contradicts the requirement that $\pi(\overline{e}) \leq \pi(e^*)$. Therefore, if $e^* < \overline{e}^*$, then $p(\overline{e}) > 0$.

With the results shown above, we can now fully characterise the distribution F as a function of e^*.

Claim C.8. *The distribution F is given as follows: (1) If $e^* \leq \underline{e}^*$, then*

$$\left\{\begin{array}{lll} F(e) = 0 & if & e < \overline{e} \\ p(\overline{e}) = 1 & if & e = \overline{e} \end{array}\right\}$$

(2) If $e^* \in (\underline{e}^*, \overline{e}^*)$, then

$$\left\{\begin{array}{lll} F(e) = \frac{1}{(1-\theta)\gamma\delta}(\sqrt{\frac{\theta\delta(1-\delta)v(e)}{v(\overline{e})-v(e)}} - 1 + \delta) & if & e \in [\underline{e}, e^*] \\ F(e) = F(e^*) & if & e \in (e^*, \overline{e}) \\ p(\overline{e}) = 1 - F(e^*) & if & e = \overline{e} \end{array}\right\}$$

with $\underline{e}$ determined by

$$v(\underline{e}) = \frac{(1-\delta)v(\overline{e})}{1-\delta+\delta\theta}$$

(3) If $e^* \geq \overline{e}^*$, then

$$\left\{\begin{array}{lll} F(e) = \frac{1}{(1-\theta)\gamma\delta}(\sqrt{\frac{\theta\delta(1-\delta)v(e)}{(1+\frac{\theta\delta(1-\delta)}{[1-\delta+(1-\theta)\gamma\delta]^2})v(e^*)-v(e)}} - 1 + \delta) & if & e \in [\underline{e}, e^*] \\ F(e) = 1 & if & e \in (e^*, \overline{e}] \\ p(\overline{e}) = 0 & if & e = \overline{e} \end{array}\right\}$$

with $\underline{e}$ determined by

$$v(\underline{e}) = \frac{(1-\delta)}{1-\delta+\delta\theta}(1+\frac{\theta\delta(1-\delta)}{[1-\delta+(1-\theta)\gamma\delta]^2})v(e^*)$$

Note that part (1) has been derived before. For part (2), note that the equilibrium requires condition

$$\pi(\overline{e}) = v(\overline{e})b_N = \pi(e) = v(e)(b_N + b_R(e))$$

for $e \in [\underline{e}, e^*]$. Plug in b_N and $b_R(e)$ and after some algebra, we obtain:

$$F(e) = \frac{1}{(1-\theta)\gamma\delta}(\sqrt{\frac{\theta\delta(1-\delta)v(e)}{v(\overline{e})-v(e)}} - 1 + \delta)$$

for $e \in [\underline{e}, e^*]$. Moreover, $F(\underline{e}) = 0$ implies that $\underline{e}$ is determined by

$$v(\underline{e}) = \frac{(1-\delta)v(\overline{e})}{1-\delta+\delta\theta}$$

which satisfies $\underline{e} \in (0, \overline{e})$.

For part (3), since $p(\overline{e}) = 0$ if $e^* \geq \overline{e}^*$, the previous analysis shows that the distribution F is continuous and has no mass point in the interval $[\underline{e}, e^*]$. With $F(e^*) = 1$, the equilibrium requires condition

$$\pi(e^*) = v(e^*)(b_N + b_R(e^*)) = \pi(e) = v(e)(b_N + b_R(e))$$

for $e \in [\underline{e}, e^*]$. Plug in b_N and $b_R(e)$ and after some algebra, we obtain

$$F(e) = \frac{1}{(1-\theta)\gamma\delta}(\sqrt{\frac{\theta\delta(1-\delta)v(e)}{(1+\frac{\theta\delta(1-\delta)}{[1-\delta+(1-\theta)\gamma\delta]^2})v(e^*)-v(e)}} - 1 + \delta)$$

for $e \in [\underline{e}, e^*]$. In addition, $F(\underline{e}) = 0$ implies that $\underline{e}$ determined by

$$v(\underline{e}) = \frac{(1-\delta)}{1-\delta+\delta\theta}(1 + \frac{\theta\delta(1-\delta)}{[1-\delta+(1-\theta)\gamma\delta]^2})v(e^*)$$

Now we proceed to show the existence and uniqueness of equilibrium. Let function $H(e^*)$ be denoted as

$$H(e^*) = e^* - (1-\gamma)u - \gamma\int_0^{\overline{e}} e dF(e) + \theta\gamma\delta\beta\int_0^{e^*} \frac{F(e)}{1-\delta\beta+(1-\theta)\gamma\delta\beta F(e)} de \quad \text{(A.1)}$$

Integration by parts, $H(e^*)$ can also be expressed as

$$H(e^*) = (1-\gamma)(e^*-u) - \gamma(\overline{e}-e^*)p(\overline{e}) + \int_0^{e^*}(\gamma F(e) + \frac{\theta\gamma\delta\beta F(e)}{1-\delta\beta+(1-\theta)\gamma\delta\beta F(e)})de \quad \text{(A.2)}$$

Claim C.9. *$H(e^*)$ is continuous and is strictly increasing on the interval $[0, \overline{e}]$.*

Continuity of $H(e^*)$ can be established by verifying that the distribution F as a function of e^* is continuous on the cutoff values $\underline{e}^*$ and $\overline{e}^*$.

If $e^* \leq \underline{e}^*$, then $p(\overline{e}) = 1$, and so $H(e^*) = e^* - (1-\gamma)u - \gamma\overline{e}$, which strictly increases in e^*.

If $e^* \in (\underline{e}^*, \overline{e}^*)$, then note that $\underline{e}$ and $F(e)$ on $e \in [\underline{e}, e^*)$ are independent of e^*, and $p(\overline{e})$ strictly decreases in e^*. Therefore, both the term $-\gamma(\overline{e}-e^*)p(\overline{e})$ and the integral in (A.2) strictly increases in e^*. Overall, $H(e^*)$ strictly increases in e^*.

Lastly, consider $e^* \geq \overline{e}^*$. In this case $p(\overline{e}) = 0$. Let $\Delta = (1 + \theta\delta(1-\delta)/[1-\delta + (1-\theta)\gamma\delta]^2)$ for short, and let

$$y = x(e) = \frac{\theta\delta(1-\delta)v(e)}{\Delta v(e^*) - v(e)}$$

Therefore,

$$v(e) = \frac{y\Delta v(e^*)}{\theta\delta(1-\delta) + y} \text{ and } \frac{de}{dy} = \frac{\theta\delta(1-\delta)\Delta v(e^*)}{v'(e)[\theta\delta(1-\delta) + y]^2}$$

Also, let

$$\overline{y} = x(e^*) = [1-\delta + (1-\theta)\gamma\delta]^2 \text{ and } \underline{y} = x(\underline{e}) = (1-\delta)^2$$

Using integration by substitution, in this case $H(e^*)$ can be expressed as

$$\begin{aligned} H(e^*) &= (1-\gamma)(e^* - u) + \int_{\underline{y}}^{\overline{y}} \frac{\sqrt{y} - 1 + \delta}{(1-\theta)\delta}(1 + \frac{\theta\delta\beta}{1 - \delta\beta + \beta(\sqrt{y} - 1 + \delta)})\frac{de}{dy}dy \\ &= (1-\gamma)(e^* - u) + \int_{\underline{y}}^{\overline{y}} \frac{\sqrt{y} - 1 + \delta}{(1-\theta)\delta}(1 + \frac{\theta\delta\beta}{1 - \delta\beta + \beta(\sqrt{y} - 1 + \delta)})\frac{\theta\delta(1-\delta)\Delta v(e^*)}{v'(e)[\theta\delta(1-\delta) + y]^2}dy \end{aligned} \tag{A.3}$$

Fix any $y \in [\underline{y}, \overline{y}]$, e increases in $e^* \in [\overline{e}^*, \overline{e}]$, and therefore $v'(e)$ decreases in $e^* \in [\overline{e}^*, \overline{e}]$. Because the increase of e^* affects the integral in (A.3) only through $v(e^*)$ and $v'(e)$, $H(e^*)$ strictly increases in e^*.

Note that if $H(e^*) = 0$ for some $e^* \in [0, \overline{e}]$, then the value e^* and the corresponding distribution $F(e)$ consist of an equilibrium. If $H(e^*) < 0$ for any $e^* \in [0, \overline{e}]$, then $e^* = \overline{e}$ and the associated distribution $F(e)$ consist of an equilibrium. Because $H(e^*)$ is continuous and strictly increases in $e^* \in [0, \overline{e}]$, the equilibrium exists and is unique. We summarise these results using the following claim.

Claim C.10. *There is a unique profile e^* and F that consists of an equilibrium. The equilibrium satisfies that:*

$$\left\{ \begin{array}{ccc} H(\overline{e}) \leq 0 & \Rightarrow & e^* = \overline{e} \quad \textit{and} \quad p(\overline{e}) = 0 \\ H(\overline{e}^*) \leq 0 < H(\overline{e}) & \Rightarrow & \overline{e}^* \leq e^* < \overline{e} \quad \textit{and} \quad p(\overline{e}) = 0 \\ H(\overline{e}^*) > 0 & \Rightarrow & \underline{e}^* \leq e^* < \overline{e}^* \quad \textit{and} \quad p(\overline{e}) > 0 \end{array} \right\}$$

Moreover, the distribution F is fully described by Claim 8.

Proof of Proposition 2.

In this proof, we let $H(e^*; z)$ include a second argument z, where $z \in \{\gamma, \theta, u, \overline{e}\}$ is the parameter that our comparative statics analysis focuses on.

Part (1): As $\gamma \in (0, 1)$ increases, the average level of markup chosen by lenders first strictly decreases and then strictly increases.

We first show that $H(e^*; \gamma)$ strictly increases in γ. Note that $\underline{e}^*$ is independent of γ, but $\overline{e}^*$ strictly increases in γ.

Starting with $e^* \leq \underline{e}^*$, as γ increases, $e^* \leq \underline{e}^*$ still holds. In this case $p(\overline{e}) = 1$, and so $H(e^*; \gamma) = e^* - u + \gamma(u - \overline{e})$, which strictly increases in γ.

Starting with $e^* \in (\underline{e}^*, \overline{e}^*)$, as γ increases, $e^* \in (\underline{e}^*, \overline{e}^*)$ still holds. In this case, $H(e^*; \gamma)$ can be expressed as

$$H(e^*;\gamma) = (e^* - u) + \gamma(u - \overline{e}) + \gamma F(e^*)(\overline{e} - e^*) + \int_0^{e^*} (\gamma F(e) + \frac{\theta\gamma\delta\beta F(e)}{1 - \delta\beta + (1-\theta)\gamma\delta\beta F(e)})de$$

Because $\underline{e}$, $\gamma F(e^*)$ and $\gamma F(e)$ are independent of γ, $H(e^*;\gamma)$ strictly increases in γ.

Starting with $e^* \geq \overline{e}^*$, as γ increases, consider the case that $e^* \geq \overline{e}^*$ still holds. In this case $p(\overline{e}) = 0$, $\underline{e}$ strictly decreases in γ, and $\gamma F(e)$ strictly increases in γ. Thus, $H(e^*;\gamma)$ strictly increases in γ. On the other hand, starting with $e^* \geq \overline{e}^*$, as γ increases, consider the case that e^* becomes less than $\overline{e}^*$. Because $H(e^*;\gamma)$ changes continuously at $e^* = \overline{e}^*$ as γ increases, together with the analysis above, in this case $H(e^*;\gamma)$ also strictly increases in γ.

Consider $H(\overline{e};\gamma)$ expressed by (A.2). If γ converges to 0, then $\underline{e}$ converges to $\overline{e}$, the integral in (A.2) converges to 0, and therefore $H(\overline{e};\gamma)$ converges to $\overline{e} - u < 0$. On the other hand, if γ converges to 1, then $H(\overline{e};\gamma)$ converges to the integral in (A.2) which is strictly positive. Thus, there is a unique $\underline{\gamma} \in (0,1)$ such that $H(\overline{e};\underline{\gamma}) = 0$.

Consider $H(\overline{e}^*;\gamma)$ expressed by (A.2), but note that $\overline{e}^*$ strictly increases in γ and $H(\overline{e}^*;\gamma)$ strictly increases in both arguments. If γ converges to 0, $H(\overline{e}^*;\gamma)$ is strictly less than $H(\overline{e};\gamma)$, which converges to $\overline{e} - u < 0$. On the other hand, if γ converges to 1, then $H(\overline{e}^*;\gamma)$ converges to the integral in (A.2) which is strictly positive. Thus, there is a unique $\overline{\gamma} \in (0,1)$ such that $H(\overline{e}^*;\overline{\gamma}) = 0$.

As $H(e^*;\gamma)$ strictly increases in e^*, in equilibrium, e^* strictly decreases in γ if $e^* < \overline{e}$, and e^* weakly decreases in γ if $e^* = \overline{e}$. Because $\overline{e}^* < \overline{e}$, so $\overline{\gamma} > \underline{\gamma}$. We summarise the analysis on $H(e^*;\gamma)$ by follows:

$$\left\{ \begin{array}{ccc} \gamma \leq \underline{\gamma} & \Rightarrow & H(\overline{e};\gamma) \leq 0 \\ \underline{\gamma} < \gamma \leq \bar{\gamma} & \Rightarrow & H(\overline{e}^*;\gamma) \leq 0 < H(\overline{e};\gamma) \\ \gamma > \bar{\gamma} & \Rightarrow & H(\overline{e}^*;\gamma) > 0 \end{array} \right\}$$

Consider $\gamma \leq \underline{\gamma}$, so $e^* = \overline{e}$ and $p(\overline{e}) = 0$ in equilibrium. As γ increases in this range, $\underline{e}$ strictly decreases. Moreover, because choosing markups $\overline{e}$ and any $e \in [\underline{e}, \overline{e}]$ generates the same profit for the lenders, we have the condition

$$v(e)(1 + \frac{\theta\delta(1-\delta)}{[1 - \delta + (1-\theta)\gamma\delta F(e)]^2}) = v(\overline{e})(1 + \frac{\theta\delta(1-\delta)}{[1 - \delta + (1-\theta)\gamma\delta]^2})$$

from which we can verify that $F(e)$ strictly increases in γ. Therefore, as $\gamma \leq \underline{\gamma}$ and increases, the average level of markup strictly decreases.

Consider $\underline{\gamma} \leq \gamma \leq \overline{\gamma}$, so $e^* \leq \overline{e}$ and $p(\overline{e}) = 0$ in equilibrium. As γ increases in this range, both e^* and $\underline{e}$ strictly decreases. Because choosing markups e^* and any $e \in [\underline{e}, e^*]$ generates the same profit for the lenders, we have the condition

$$v(e)(1 + \frac{\theta\delta(1-\delta)}{[1 - \delta + (1-\theta)\gamma\delta F(e)]^2}) = v(e^*)(1 + \frac{\theta\delta(1-\delta)}{[1 - \delta + (1-\theta)\gamma\delta]^2})$$

from which we can verify that $F(e)$ strictly increases in γ. Therefore, as $\underline{\gamma} \leq \gamma \leq \overline{\gamma}$ and increases, the average level of markup strictly decreases. In particular, as γ converges to $\overline{\gamma}$, $\underline{e}$ converges to $\underline{e}^*$ and e^* converges to $\overline{e}^*$.

Consider $\gamma \geq \overline{\gamma}$, so $\underline{e}^* < e^* \leq \overline{e}^*$ and $p(\overline{e}) \geq 0$ in equilibrium. As γ increases in this range, $\underline{e}$ is independent of γ, both e^* and $F(e)$ strictly decreases in γ, $p(\overline{e})$

strictly increases in γ. Therefore, as $\gamma \geq \overline{\gamma}$ and increases, the average level of markup strictly increases. In particular, as γ converges to 1, e^* converges to $\underline{e}^*$ and $p(\overline{e})$ converges to 1.

In sum, the average level of markup strictly decreases in γ for $\gamma \leq \overline{\gamma}$, and strictly increases in γ for $\gamma \geq \overline{\gamma}$.

Part (2): As $\theta \in (0,1)$ increases, the average level of markup chosen by lenders changes non-monotonically.

Consider that θ is arbitrarily close to 0. In this case, in equilibrium $b_R(\underline{e})$ is arbitrarily close to 0, therefore the profit $v(\underline{e})(b_N + b_R(\underline{e}))$ of a lender who chooses the markup $\underline{e}$ is arbitrarily close to $v(\underline{e})b_N$. At minimum, the lender obtains profit $v(\overline{e})b_N$ by choosing the markup $\overline{e}$, $\underline{e}$ must be arbitrarily close to $\overline{e}$ in equilibrium. Therefore, if θ is arbitrarily close to 0, the average level of markup is arbitrarily close to $\overline{e}$.

Consider that θ is arbitrarily close to 1. In this case, in equilibrium $b_R(\underline{e})$ is arbitrarily close to $b_R(e^*)$. Because $v(\underline{e})(b_N + b_R(\underline{e})) = v(e^*)(b_N + b_R(e^*))$, $\underline{e}$ must be arbitrarily close to e^* in equilibrium. Moreover, we show that e^* must be arbitrarily close to $\overline{e}$. Suppose not. So there exists a number $\omega > 0$ such that, for θ being arbitrarily close to 1, $\overline{e} - e^* > \omega$. Consider a lender who chooses a markup $e^* + \varepsilon$, where $\varepsilon > 0$ is arbitrarily small. If an unmatched borrower who meets this lender for the first time decides to match with this lender, then the borrower's value from this match starting from the next period, denoted as $V(e^* + \varepsilon)$, is arbitrarily close to $(u - e^* - \varepsilon + (1-\delta)\beta V_0)/(1-\delta\beta)$. On the other hand, if the unmatched borrower decides not to match with this lender, her value from being unmatched starting from the next period is V_0. Because $V(\underline{e})$ is bounded by $(u - \underline{e})/(1-\beta)$ from above, we have $V_0 < \gamma(u - \underline{e})/(1-\beta)$. Then,

$$V(e^* + \varepsilon) - V_0 > \frac{u - (e^* + \varepsilon) - \gamma(u - \underline{e})}{1 - \delta\beta} > 0$$

because γ is strictly less than 1 and $\underline{e}$ is arbitrarily close to $e^* + \varepsilon$. Therefore, facing a markup $e^* + \varepsilon$, an unmatched borrower should also choose to match with the lender, which contradicts the requirement that an unmatched borrower chooses to match with a lender if and only if the latter charges an amount which is less than e^*. In sum, if θ is arbitrarily close to 1, both $\underline{e}$ and the average level of markup are arbitrarily close to $\overline{e}$.

From Part (1), we see that if θ is not arbitrarily close to 0 or 1, the average level of markup could be strictly less than $\overline{e}$. Therefore, as $\theta \in (0,1)$ increases, the average level of markup chosen by the lenders changes non-monotonically.

Part (3): As $\overline{e} \in [0, u]$ increases, the average level of markup chosen by lenders strictly increases.

We restrict the change of $\overline{e}$ within the range of $[0, u]$. We first show that $H(e^*; \overline{e})$ decreases in $\overline{e}$. Note that both $\underline{e}^*$ and $\overline{e}^*$ strictly increases in $\overline{e}$.

Starting with $e^* \leq \underline{e}^*$, as $\overline{e}$ increases, $e^* \leq \underline{e}^*$ still holds. In this case $p(\overline{e}) = 1$, and so $H(e^*; \overline{e}) = e^* - (1-\gamma)u - \gamma\overline{e}$, which strictly decreases in $\overline{e}$.

Starting with $e^* \in (\underline{e}^*, \overline{e}^*)$, as $\overline{e}$ increases, consider the case that $e^* > \underline{e}^*$ still holds. In this case $p(\overline{e}) > 0$, $\underline{e}$ strictly increases in $\overline{e}$, and $F(e)$ strictly decreases in $\overline{e}$. Thus, in (A.2) $p(\overline{e})$ strictly increases and the integral strictly decreases in $\overline{e}$. Overall,

$H(e^*;\overline{e})$ strictly decreases in $\overline{e}$. On the other hand, starting with $e^* \in (\underline{e}^*, \overline{e}^*)$, as $\overline{e}$ increases, consider the case that e^* becomes less than $\underline{e}^*$. Because $H(e^*;\overline{e})$ changes continuously at $e^* = \underline{e}^*$ as $\overline{e}$ increases, combining the analysis above, in this case $H(e^*;\overline{e})$ also strictly decreases in $\overline{e}$.

Starting with $e^* \geq \overline{e}^*$, as $\overline{e}$ increases, consider the case that $e^* \geq \overline{e}^*$ still holds. In this case $p(\overline{e}) = 0$, both $\underline{e}$ and $F(e)$ are independent of $\overline{e}$. Thus, $H(e^*;\overline{e})$ does not change. On the other hand, starting with $e^* \geq \overline{e}^*$, as $\overline{e}$ increases, consider the case that e^* becomes less than $\overline{e}^*$. Because $H(e^*;\overline{e})$ changes continuously at $e^* = \overline{e}^*$ as $\overline{e}$ increases, combining the analysis above, $H(e^*;\overline{e})$ is first constant and then strictly decreases as $\overline{e}$ increases.

Consider $H(\overline{e};\overline{e})$ expressed by (A.2). Modifying the integration by substitution in the Proof of Proposition 1 by replacing e^* with $\overline{e}$, $H(\overline{e};\overline{e})$ can be expressed as

$$H(\overline{e};\overline{e}) = (1-\gamma)(\overline{e}-u)+\int_{\underline{y}}^{\overline{y}} \frac{\sqrt{y}-1+\delta}{(1-\theta)\delta}(1+\frac{\theta\delta\beta}{1-\delta\beta+\beta(\sqrt{y}-1+\delta)})\frac{\theta\delta(1-\delta)\Delta v(\overline{e})}{v'(e)[\theta\delta(1-\delta)+y]^2}dy$$

which strictly increases in $\overline{e}$. Moreover, $H(0;0) = -(1-\gamma)u < 0$ and $H(u;u) > 0$, there exists a unique $\overline{e}_L \in (0,u)$ such that $H(\overline{e};\overline{e}) = 0$ for $\overline{e} = \overline{e}_L$, $H(\overline{e};\overline{e}) < 0$ for $\overline{e} < \overline{e}_L$, and $H(\overline{e};\overline{e}) > 0$ for $\overline{e} > \overline{e}_L$.

Consider $H(\overline{e}^*;\overline{e})$ expressed by (A.2), and note that $\overline{e}^*$ strictly increases in $\overline{e}$. Modifying the integration by substitution in the Proof of Proposition 1 by replacing e^* with $\overline{e}^*$, $H(\overline{e}^*;\overline{e})$ can be expressed as

$$H(\overline{e}^*;\overline{e}) = (1-\gamma)(\overline{e}^*-u)+\int_{\underline{y}}^{\overline{y}} \frac{\sqrt{y}-1+\delta}{(1-\theta)\delta}(1+\frac{\theta\delta\beta}{1-\delta\beta+\beta(\sqrt{y}-1+\delta)})\frac{\theta\delta(1-\delta)\Delta v(\overline{e}^*)}{v'(e)[\theta\delta(1-\delta)+y]^2}dy$$

which strictly increases in $\overline{e}$. Moreover, $H(0;0) = -(1-\gamma)u < 0$. On the other hand, if $H(\overline{e}^*;\overline{e}) > 0$ for $\overline{e} = u$, then there exists a unique $\overline{e}_H \in (0,u)$ such that $H(\overline{e}^*;\overline{e}) = 0$ for $\overline{e} = \overline{e}_H$, $H(\overline{e}^*;\overline{e}) < 0$ for $\overline{e} < \overline{e}_H$, and $H(\overline{e}^*;\overline{e}) > 0$ for $\overline{e} > \overline{e}_H$; if $H(\overline{e}^*;\overline{e}) \leq 0$ for $\overline{e} = u$, then we define $\overline{e}_H = u$.

As $H(e^*;\overline{e})$ strictly increases in e^*, in equilibrium, e^* increases in $\overline{e}$. Because $\overline{e}^* < \overline{e}$, so $\overline{e}_L < \overline{e}_H$. For $\overline{e} \in [0,u]$, we summarise the analysis on $H(e^*;\overline{e})$ by follows:

$$\left\{ \begin{array}{ccc} \overline{e} \leq \overline{e}_L & \Rightarrow & H(\overline{e};\overline{e}) \leq 0 \\ \overline{e}_L < \overline{e} \leq \overline{e}_H & \Rightarrow & H(\overline{e}^*;\overline{e}) \leq 0 < H(\overline{e};\overline{e}) \\ \overline{e} > \overline{e}_H & \Rightarrow & H(\overline{e}^*;\overline{e}) > 0 \end{array} \right\}$$

Consider $\overline{e} \leq \overline{e}_H$, so $p(\overline{e}) = 0$ is in equilibrium. As $\overline{e}$ increases, both e^* and $\underline{e}$ strictly increases so the support of the distribution $F(e)$ shifts to the right. Moreover, for any e in the support, $F(e)$ strictly decreases in $\overline{e}$. Therefore, as $\overline{e} \leq \overline{e}_H$ and increases, the average level of markup strictly increases.

Consider $\overline{e} \geq \overline{e}_H$, so $p(\overline{e}) \geq 0$ in equilibrium. As $\overline{e}$ increases, both e^* and $\underline{e}$ strictly increases so the support of the distribution $F(e)$ shifts to the right. Moreover, for any e in the support, $F(e)$ strictly decreases in $\overline{e}$, and $p(\overline{e})$ strictly increases. Therefore, as $\overline{e} > \overline{e}_H$ and increases, the average level of markup strictly increases.

In sum, the average level of markup strictly increases in $\overline{e}$.

Part (4): As $u \in [\overline{e}, +\infty)$ increases, the average level of markup chosen by lenders may first strictly decrease, but must then strictly increase, and eventually become constant.

We restrict the change of u within the range of $[\overline{e}, +\infty)$. Given that the distribution $F(e)$ is independent of u, then $H(e^*; u)$ strictly decreases in u. As $H(e^*; u)$ strictly increases in e^*, in equilibrium, e^* strictly increases in u if $e^* < \overline{e}$, and e^* does not change with u if $e^* = \overline{e}$. Moreover, $H(\overline{e}; u) > 0$ for $u = \overline{e}$, and $H(\overline{e}; u) < 0$ for u goes to $+\infty$. Thus, there exists a unique $\overline{u}$, where $\overline{u} > \overline{e}$, such that $H(\overline{e}; u) = 0$ for $u = \overline{u}$, $H(\overline{e}; u) > 0$ for $u < \overline{u}$ and $H(\overline{e}; u) < 0$ for $u > \overline{u}$.

Without additional conditions, the sign of $H(\overline{e}^*; u)$ for $u = \overline{e}$ is not clear. If $H(\overline{e}^*; u) > 0$ for $u = \overline{e}$, then there exists a unique $\underline{u}$, where $\overline{u} > \underline{u} > \overline{e}$, such that $H(\overline{e}^*; u) = 0$ for $u = \underline{u}$, $H(\overline{e}^*; u) > 0$ for $u < \underline{u}$ and $H(\overline{e}^*; u) < 0$ for $u > \underline{u}$. If $H(\overline{e}^*; u) \leq 0$ for $u = \overline{e}$, then we define $\underline{u} = \overline{e}$.

Consider $u < \underline{u}$, so $e^* < \overline{e}^*$ is in equilibrium. As u increases, both $\underline{e}$ and $F(e)$ are independent of u, e^* strictly increases and $p(\overline{e})$ strictly decreases in u. In this case, the average level of markup strictly decreases.

Consider $\underline{u} \leq u < \overline{u}$, so $\overline{e}^* \leq e^* < \overline{e}$ in equilibrium. As u increases, both $\underline{e}$ and e^* strictly increases so the support of the distribution $F(e)$ shifts to the right, and for any e in the support, $F(e)$ strictly decreases in u. In this case, the average level of markup strictly increases.

Consider $u \geq \overline{u}$, so $e^* = \overline{e}$ is in equilibrium. As u increases, $\underline{e}$, e^* and $F(e)$ do not change. In this case, the average level of markup is constant.

In sum, the average level of markup strictly decreases in u for $u < \underline{u}$ (note that this case is not valid if $\underline{u} = \overline{e}$), strictly increases in u for $\underline{u} \leq u < \overline{u}$, and is constant for $u \geq \overline{u}$.

Part (5): Changing the number of lenders or borrowers has no effect on the average level of markup or the dispersion of markups in equilibrium.

To see this, note that $H(e^*)$, and therefore e^* and $F(e)$ in equilibrium, are all independent of the measures μ and ρ.

C.3 Difference Compared to Burdett-Mortensen (1998)

Asymmetric information is also a key feature in the unlicensed moneylending market: borrowers learn how much lenders will charge from them only after experiencing the entire loan repayment process. In the manuscript, we show that when asymmetric information is applied in a search theoretical model to capture the key features of the unlicensed moneylending market in Section 4, the distribution of markups exhibits a hump over a range of values together with a mass point for some ranges of parameters. Our data shows that the distribution of markups are double humped in shape. Therefore, we believe that the model captures this empirical observation well.

In the following, we show that if there is no asymmetric information in the unlicensed moneylending market such that a borrower has perfect information about how much the lender will charge her before the transaction is made, so the model degenerates to a standard Burdett and Mortensen (1998) model, the equilibrium distribution of markups can not have a mass point.

Let $F(e)$ denote an arbitrary distribution of markups in the market. Let e^* denote the cutoff value that an unmatched borrower decides to match with a lender if and only if the lender charges a markup $e \leq e^*$. The value function V_0 for an unmatched borrower is given by

$$V_0 = \gamma[u + \int_0^{\overline{e}} (-e' + \delta\beta \max\{V_0, V(e')\})dF(e')] + (1-\gamma)\delta\beta V_0 + (1-\delta)\beta V_0$$

The value function $V(e)$ for a matched borrower whose regular lender charges an amount e is given by

$$\begin{aligned} V(e) = \gamma[u + \theta \int_0^{\overline{e}} (\max\{-e + \delta\beta \max\{V_0, V(e)\}, -e' + \delta\beta \max\{V_0, V(e), V(e')\}\})dF(e') \\ + (1-\theta) \int_0^{\overline{e}} (-e' + \delta\beta \max\{V_0, V(e), V(e')\})dF(e')] \\ + (1-\gamma)[\theta(u - e + \delta\beta \max\{V_0, V(e)\} + (1-\theta)\delta\beta V_0] + (1-\delta)\beta V_0 \end{aligned}$$

Unlike in the model with asymmetric information where a matched borrower always chooses to borrow from her regular lender whenever her regular lender is available, in the model without asymmetric information, a matched borrower can directly compare the markups of her regular lender and of a new lender when both lenders are available. The expression $\max\{-e + \delta\beta \max\{V_0, V(e)\}, -e' + \delta\beta \max\{V_0, V(e), V(e')\}\}$ captures the borrower's decision in this situation. As a result, if the new lender's choice of markup e' is less than the regular lender's choice of markup e, the borrower will choose to borrow from the new lender and form a match with him even when her regular lender is available.

Further, we show that $V(e) > V_0$ for any $e \in [0, \overline{e}]$. Therefore, $e^* = \overline{e}$, implying that an unmatched borrower will form a match with any lender she meets in the market. In the model without asymmetric information, both a matched borrower and an unmatched borrower have the same opportunity to learn about a new lender's choice of markup. However, being a matched borrower allows the borrower an option to borrow from her regular lender when the regular lender is available and if the regular charges less. Therefore, in the model without asymmetric information, being matched is always better than being unmatched.

Let a denote the proportion of borrowers who are unmatched in the steady state. In each period, the measure of borrowers who change from the unmatched state to the matched state is $\mu a \gamma \delta$, while the measure of borrowers who change from the matched state to the unmatched state is $\mu(1-a)(1-\delta)$. In the steady state, these two measures equal each other, which implies that

$$a = \frac{1-\delta}{1-\delta+\gamma\delta}$$

Let $G(e)$ denote the distribution of markups that borrowers face in the steady state conditional on being matched. Thus, at the beginning of each period, the measure of matched borrowers who face markups in the interval $[e, \overline{e}]$ is $\mu(1-a)(1-G(e))$. In this period, the measure of borrowers who enter this group is $\mu a \gamma \delta(1-F(e))$. On the other hand, in this period the measure of borrowers who exit this

group is $\mu(1-a)(1-G(e))[1-\delta+\gamma\delta F(e)]$, including borrowers whose matches with their regular lenders are exogenously terminated and borrowers who switch their matches to new lenders with lower levels of markups in the interval $[0, e)$. In the steady state, these two measures equal each other, which implies that

$$\mu a\gamma\delta(1-F(e)) = \mu(1-a)(1-G(e))[1-\delta+\gamma\delta F(e)]$$

Therefore,

$$G(e) = 1 - \frac{(1-\delta)(1-F(e))}{[1-\delta+\gamma\delta F(e)]}$$

for $e \in [0, \overline{e}]$.

Let $R(e)$ denote the measure of regular borrowers of a lender who charges a markup e. Conditional on being matched, the measure of borrowers who face markups in the interval $[e-\epsilon, e]$ is $\mu(1-a)(G(e)-G(e-\epsilon))$; on the other hand, the measure of lenders who choose markups in this interval is $\rho(F(e)-F(e-\epsilon))$. In the steady state, $R(e)$ is determined by

$$R(e) = \lim_{\epsilon\to 0}\frac{\mu(1-a)(G(e)-G(e-\epsilon))}{\rho(F(e)-F(e-\epsilon))} = \frac{\mu(1-a)G'(e)}{\rho F'(e)}$$

With algebraic manipulation, we obtain

$$R(e) = \frac{\mu\gamma}{\rho}\frac{\delta(1-\delta)}{[1-\delta+\gamma\delta F(e)]^2}$$

Let $b(e)$ denote the measure of loan transactions that a lender who charges a markup e has in a period. Thus, $b(e)$ contains loan transactions from four groups of borrowers: (1) unmatched borrowers, which is $\mu a\gamma/\rho$, (2) matched borrowers whose regular lenders are temporarily unavailable, which is $\mu(1-a)(1-\theta)\gamma/\rho$, (3) matched borrowers whose regular lenders are available, which is $\mu(1-a)\theta\gamma(1-G(e))/\rho$, and (4) the lender's regular borrowers, which is $\theta(1-\gamma+\gamma(1-F(e)))R(e)$. In total,

$$\begin{aligned} b(e) &= \frac{\mu a\gamma}{\rho} + \frac{\mu(1-a)(1-\theta)\gamma}{\rho} + \frac{\mu(1-a)\theta\gamma(1-G(e))}{\rho} + \theta(1-\gamma F(e))R(e) \\ &= \frac{\mu\gamma}{\rho}\frac{(1-\delta)\theta\delta + [1-\delta+(1-\theta)\gamma\delta F(e)]^2}{[1-\delta+\gamma\delta F(e)]^2} \end{aligned}$$

We show that there is a value $\underline{e} > 0$ such that any markup e chosen in equilibrium satisfies $e \geq \underline{e}$. To see this, note that

$$\pi(0) = v(0)b(0) = 0 < \pi(\overline{e}) = v(\overline{e})b(\overline{e})$$

That is, charging $e = 0$ only generates profit 0 to a lender, which is strictly worse than charging $\overline{e}$. Therefore there must be a value $\underline{e} > 0$ such that any markup chosen by the lenders in equilibrium is larger than this particular level of markup.

We next show that the distribution F has no mass point in the interval $[\underline{e}, \overline{e}]$. Suppose not. Assume that there is a positive measure of lenders who charge $e \in [\underline{e}, \overline{e}]$ in equilibrium, and consider one such lender. If this lender deviates to charge

$e - \epsilon$, which is arbitrarily close to e, he could increase his loan transactions in each period by a discrete amount, while reducing profit per transaction by only an arbitrarily small amount. Therefore the deviation is strictly profitable for this lender. A contradiction.

We also show that the support of the distribution F is connected and is given by $[\underline{e}, \overline{e}]$. Suppose not. Assume that there is a gap between e_1 and e_2, where $\underline{e} \leq e_1 < e_2 \leq \overline{e}$. This implies that $F(e_1) = F(e_2)$ and $b(e_1) = b(e_2)$. But then

$$\pi(e_1) = v(e_1)b(e_1) < \pi(e_2) = v(e_2)b(e_2)$$

Therefore charging e_1 is strictly worse than charging e_2 for a lender, which contradicts the markup e_1 that is chosen by some lenders in equilibrium.

A similar argument shows that the distribution F cannot be constant over any range $[e_1, e_2]$, where $\underline{e} \leq e_1 < e_2 \leq \overline{e}$.

In sum, the distribution F in equilibrium is continuous and strictly increases on the support $[\underline{e}, \overline{e}]$. Explicitly, condition $\pi(e) = \pi(\overline{e})$ for any $e \in [\underline{e}, \overline{e}]$ implies that the distribution F is determined by

$$\frac{(1-\delta)\theta\delta + [1-\delta+(1-\theta)\gamma\delta F(e)]^2}{[1-\delta+\gamma\delta F(e)]^2} v(e) = \frac{(1-\delta)\theta\delta + [1-\delta+(1-\theta)\gamma\delta]^2}{[1-\delta+\gamma\delta]^2} v(\overline{e})$$

Moreover, $\underline{e}$ is determined by

$$\frac{(1-\delta)+\theta\delta}{1-\delta} v(\underline{e}) = \frac{(1-\delta)\theta\delta + [1-\delta+(1-\theta)\gamma\delta]^2}{[1-\delta+\gamma\delta]^2} v(\overline{e})$$

D Data and Replication

D.1 Data Collection and Methodology

Our dataset comprises two parts. The first part contains borrower characteristics and transaction data from the unlicensed moneylending market between 2009 and 2013. This proprietary data was sourced over 2011-2013 during the first author's tenure as a social worker. After the he joined academia, he expanded this dataset to study the effects of policies and enforcement on the unlicensed moneylending market. The first author and his team of enumerators collected the second dataset in 2015 and 2016 where they traced the borrowing transactions made by the same group of borrowers from 2014 to 2016. See Leong *et al.* (2016) and Li *et al.* (2017) for examples of the academic work that the first author had done on the underground economy.

The first author mapped the universe of borrowers in the unlicensed moneylending market in the whole of Singapore to develop a sample frame. The mapping methodology first identified the sites frequented by borrowers and then estimated the population size of borrowers at each of these sites. For example, these sites included gambling establishments and cafes where borrowers frequently socialised. The first author obtained information about each site via interviews with informants and implemented the snowball method thereafter. Admittedly, this method could be biased towards areas frequented by most borrowers and may overlook locations

where there are only very few borrowers, such as locations where only "part time" unlicensed moneylenders are located. These part time unlicensed moneylenders are individuals who issue illegal loans on a smaller scale and for short periods of time before exiting the market. According to our informants, these lenders' customers consisted mainly of one-off individuals looking to borrow very small sums of money. We are not concerned about this bias because according to all market participants that we spoke to, these sorts of borrowers previously mentioned constituted a "very tiny fraction" of total borrowers.

A total of 48 enumerators to conduct the interviews. The enumerators are local Singaporeans who had previously borrowed money in the unlicensed moneylending market. Enumerators with backgrounds as diverse and as representative as possible were chosen, such as ex-offenders, small business owners, low income individuals, female and male gamblers and former unlicensed moneylenders. In doing so, the first author leveraged the enumerators' diverse backgrounds to gain access to different networks, and in turn, different types of market participants to form the initial respondent pool. After having conversations with the enumerators on the unlicensed moneylending market, the first author finalised the survey questionnaire. He also guided the enumerators on proper interview procedures and ethics. For example, the enumerators were guided not to force respondents to answer questions that the respondents did not feel like discussing, and to ensure the confidentiality of the data collected. The enumerators began by checking with the respondents via phone or in person as to whether the respondents were willing to participate in the survey. The enumerators started by explaining to potential respondents that this survey is intended to study the economic behavior of borrowers (not of any individual in particular) and their individual information would neither be disclosed to anyone (except the investigators and numerators) nor disclosed in the publication related to this study. Respondents were also given a range of questions they would be asked, the duration of survey and the reassurance that they would not be obliged to answer questions that they did not feel comfortable with. If the respondents decided not to continue with the survey, they were also informed that they could stop the survey at any time. After the completion of the interviews, the enumerators submitted all the answer sheets to the first author.

The first author first obtained approval to use this dataset to study the unlicensed moneylending market by writing to the appropriate Singaporean authorities. He then submitted an application to the Nanyang Technological University (NTU) IRB to obtain ethical approval. Waiver of informed consent was requested because almost all borrowers the first author spoke to explained that borrowers would typically not sign any documents because they are aware of the potential risk of being identified by the public. Thus, they were not willing to have any paper trace of their name. Instead, verbal consent was obtained before the commencement of the interviews. The data collection was self-funded. Unlike most empirical studies that usually run into problems during data collection, the first author did not encounter many significant difficulties because he had years of prior experience working with these borrowers and ex-unlicensed moneylenders as a volunteer.

Each interview session lasted between 1.5 to 2 hours at a cafe of the respondent's choice. The refusal rate for participating in our study is very low at approximately

10%. There are three reasons for the low refusal rate. First, the individuals interviewed, especially the borrowers, were happy for the remuneration of $20 to $40 received for each interview. Second, prior to the commencement of any interview, all respondents were properly notified of the research study's purpose and the team's commitment to maintaining the confidentiality of the respondents' personal information. For example, all respondents were clearly asked upfront for their permission to release the information provided by them to other researchers and organizations wanting to study their behaviour. It was made clear that if the respondents refused, then the information would not be released. This step was crucial because if the respondents felt that there was significant risk of information leakage, they would not agree to participate in the interviews. Third, the interviews were conducted with the recommendation or physical presence of someone whom the respondent trusted. These individuals shared examples of the types of different confidential data that the first author had collected about individuals in the sex and drug industries and explained to the respondents that none of the disaggregate data that had been collected was disclosed to anyone in accordance with what the previous respondents had requested. This track record was useful in assuring the borrowers that the team would protect the information entrusted to them.

While we believe that the respondents generally provided accurate information, to further ensure the veracity of the information that was shared, extra monetary compensation of $10 was paid if the respondents could provide physical evidence of the claims that they made in the survey. Examples of physical evidence include diaries, repayment schedules and phone messages with the lenders. The respondents were generally willing to share this information, with over 50 percent providing proof of their claims. Asking for physical evidence helped minimise the risk of recall errors. Refer to Supplementary Appendix Section D.3 for more information about the measures we used to ensure that our data collection process allows us to solicit accurate information from our respondents.

After some time, the respondents who participated in the first dataset interviews observed that nothing they revealed to us was leaked to anyone without prior and explicit permission. Thereafter these same respondents were very open to accommodating further interviews. To date, with the assistance of enumerators, our dataset contains information from over 1,000 borrowers (We identified approximately 5,000 borrowers who had outstanding loans with unlicensed moneylenders at the time of the survey and selected 1,000 at random to follow over the years). We tracked this same group of individuals from 2015 to 2016.

D.2 Obtaining Approvals & Replication

We need to obtain permission from different entities in order to use the dataset. First, we need to identify the relevant Singaporean authorities to seek approval from. To do this, we visited three different police stations in Singapore (Tampines, Bedok and Holland Village). After speaking to officers at each of these branches, we obtained a number to call. Apart from this number, we also called every other police-related number we could find, including the police headquarters and the police call centre. In one of these phone calls, someone finally referred us to the Ministry

of Home Affairs. We connected with that ministry and were redirected to someone else within the organization. After a few months of appealing our case, we obtained approval but this approval is confidential and would only be sent directly to the IRB. Second, while obtaining approval from the authorities, one also needs to obtain IRB approval.

We have also taken steps to find out how we can accommodate scientists who would like to replicate the regressions we have done on our dataset to verify that the results are accurate. Based on instructions from the IRB, we cannot use the data in any way that the borrowers did not consent to. However, our results should nonetheless be verifiable. A scientist seeking to run the same regressions on this dataset to verify the results should first write to the first author. The first author will then liaise with the IRB to confirm what requirements are needed for the scientist to test the data. Upon IRB approval, the first author then will provide necessary assistance for the scientist to perform the empirical exercise adhering to the IRB's protocols. The scientist will not be allowed obtain a copy of the dataset or use the dataset to write a new paper. The entire process may take some time, but it is possible and the first author is happy and willing to work with any scientist interested in replicating our results.

A committed scientist could also replicating the data collection process as stated above. We are happy to report that after we concluded our data collection work, several others followed our footsteps and gained access to the unbanked. For example, the President of Christian Counseling (a charity that works with Singapore Prison Service) told us that he has approximately 80 counsellors who work with unbanked individuals. These unbanked individuals consist mostly of gamblers and those who are heavily in debt. After hearing of our work, Christian Counseling managed to replicate the same data collection process. In addition, several pastors from a few churches in Singapore who work with unbanked individuals have also shared that they also have access to these unbanked individuals, as some of our respondents attend these organizations. The two key elements required for the success of data collection are the dedication and time. The first author spent over six years of time to help disadvantaged individuals and to build trust with them. There are a lot of hard work involved but is possible.

D.3 Literature on Empirical Research Methodologies

D.3.1 Existing Literature

In this subsection, we provide an overview of four empirical papers that have conducted interviews with survey respondents and include a discussion about the methodology and ethical procedures these papers observed during the data collection process.

In two separate papers, Appleyard *et al.* (2016) and Rowlingson *et al.* (2016) examine the consumption of unsecured credit among low-to-moderate income citizens in the United Kingdom and the relationship between labour markets and welfare cuts with respect to payday lending. For the first study, 44 semi-structured in-depth interviews were conducted with respondents who borrowed from a variety of unlicensed moneylenders in 2013. For the second study, qualitative research was

conducted through detailed interviews with 21 borrowers who borrowed from payday lenders in 2013.

For both studies, the same data collection method was adopted. The data was collected between March to June 2014 in the West Midlands and Oxfordshire regions in the United Kingdom. A specialist company was engaged to identify potential respondents using a questionnaire crafted by the authors as a yardstick. A diverse sample of respondents who differ in age, gender, job and family type were selected. Each interview lasted between 45 minutes to 2 hours, and was conducted either at the respondent's home or a cafe. A pair of interviewers were present at all times to ensure the safety and quality of the research. Furthermore, only fully trained and experienced enumerators were allowed to conduct the interviews since the interviews involved sensitive questions.

The studies received full ethical consent from the University of Birmingham. An informed consent form explaining the nature of the research, usage of data collected and privacy of information obtained was given to the respondents before the start of the interviews. In addition, respondents were compensated with 30 pounds at the end of each interview. Such monetary compensation resulted in ethical queries, to which the authors argued that monetary rewards are crucial as compensation for the time and effort that the respondents committed. To further protect the privacy of the respondents, pseudonyms were incorporated. Each interview was digitally recorded and then transcribed.

Second, Gardner (2016) reviews the moneylending market and regulations in Singapore covering three main aspects. First, she reviewed and analysed the existing literature pertaining to moneylending in Singapore. Second, she summarised the current moneylending legislative acts, including Moneylenders Act 2010, Moneylenders Rules 2009, Moneylenders (Amendment) Rules 2012, and Licence Conditions and Advertising & Marketing Directions. Third, she summarised a total of 27 criminal cases, as well as 17 civil cases with different actions that borrowers have adopted to avoid repaying their loans.

Gardner (2016) complements her review with qualitative empirical research covering interviews with over 30 individuals, including moneylenders, members of the Moneylenders Association of Singapore, politicians who have been involved in moneylending policy-making, academics from a range of related disciplines, members of the Attorney-General's Chamber, commercial lawyers who consult on moneylending issues and organizations that support people with debt or gambling problems. Interviews were only recorded with the explicit consent of the interviewees. Gardner noted that a handful were not willing to have the interviews recorded, and thus a record of the interviews was kept via handwritten notes. While many interviewees were willing to be named in the report, the identities of respondents were generally kept anonymous.

Furthermore, out of the 172 licensed moneylenders currently operating in Singapore, Gardner employed the help of two research assistants to contact 35 businesses via phone and 66 businesses in person. The contact details of the businesses were obtained from the List of Licensed Moneylenders available online. In addition, the research assistants also contacted 2 businesses with suspended licenses and 7 businesses that were not officially registered as licensed moneylenders. Due to the nature

of study, the research assistants were chosen based on their maturity and experience. As safety was of utmost concern, proper training was provided to teach the research assistants on how to contact these businesses. The research assistants were further reminded not to contact businesses that appear unsafe and to stop the call or leave the businesses' premises immediately if any element makes the research assistants feel uncomfortable. Due to such limitations, some small businesses that were expected to be interviewed were removed from the study. For the businesses that were successfully contacted, the research assistants asked questions pertaining to a wide range of issues, such as compliance to current regulations, how borrowers who earn less than S$30,000 are treated, interest rates, fees, the loan structures available and administrative requirements. The responses given by the businesses were then recorded in an information sheet.

Third, Thompson (1996) analyses the relationship between domestic workers and their helpers through examining the work experiences and coping strategies of these workers. The underlying data for her study was collected in Jamaica over a period of 6 weeks, covering 10 Jamaican women workers of ages ranging from 28 to 60 years who were selected using a snowballing technique. The results were obtained through semi-structured interviews and non-participant observations. After each interview, the workers were compensated with a monetary amount that was equivalent to 1.5 day's pay. Workers were informed of the monetary compensation, which increased their willingness to participate and no worker expressed dissatisfaction with the amount compensated.

While traditional approaches to survey collection argue that compensation may lead to bias in data collection, Thompson argued that monetary compensation can in fact help to reduce bias. Respondents who place greater value on their time, energy and views may be unwilling to participate in the survey without compensation. Thus, monetary compensation would motivate such potential respondents to be more inclined to participate in studies.

D.3.2 Comparison with Existing literature

In this subsection, we explain the similarities and differences between our manuscript and the four papers in the previous subsection in the following dimensions: (a) the type of data collected, (b) the data collection methodology and (c) ethical considerations in the data collection process.

We aim to analyse the behavior of individuals who borrow from unlicensed moneylenders in Singapore based on two datasets. The first dataset consists of information sourced over 2011-2013 though the first author's social enterprise Princeton Mind. The second dataset is an extension of the first dataset, where we and our enumerators traced the same group of borrowers in 2015 and these borrowers' respective transaction data.

Unlike the four papers discussed earlier, quantitative data in the form of a face-to-face interview that lasted for 1.5 to 2 hours was collected by interviewing respondents at their preferred cafe. Rather than interviewing a diverse set of borrowers who had access to alternative credit for at least half a year, i.e., Appleyard *et al.* (2016) and Rowlingson *et al.* (2016), the first author placed no restriction on the type of credit

and borrowing period of the potential respondents. The first author sourced enumerators from backgrounds as diverse as possible to maximise the representativeness of the respondent pool.

We adopted a mapping methodology to find a sampling frame as opposed to crafting a questionnaire that Appleyard *et al.* (2016) and Rowlingson *et al.* (2016) did for their studies. We first identified the locations that borrowers frequented and then estimated the population size at each specific location. After each interview with the informants (borrowers, ex-lenders, gamblers, referrals by government agencies etc.), a snowballing method similar to the method used by Thompson (1996) was applied to discover new transaction locations. We concede using this method may lead to bias, as less frequented areas will be overlooked. However, we argue that this does not pose a problem because respondents have told us that these less frequented areas constitute only a tiny fraction of the total borrowers in the market.

Both studies done by Appleyard *et al.* (2016) and Rowlingson *et al.* (2016) rely on the use of experienced and well-trained interviewers. However, as respondents are particularly sensitive when it comes to sharing their borrowing history with strangers, we employed 48 enumerators who were also themselves former illegal loan borrowers and friends of the respondents to conduct the interviews instead. Consequently, all investigators in this study had nearly no interaction with the respondents. Because the enumerators were not experienced interviewers, we took extra steps to train the enumerators in proper interviewing procedures and etiquette before the data collection process started. For example, the enumerators were guided on the importance of not forcing respondents to answer questions that the respondents are not comfortable with and were guided on the need to ensure data confidentiality.

Before the start of the interviews, the enumerators called potential respondents to explain the purpose of the study and to pledge to keep all private information confidential. Thereafter, the enumerators met each respondent at the respondent's preferred cafe. Each interview lasted between 1.5 to 2 hours and respondents were compensated between S$20 to S$40 for their time and effort. According to Thompson (1996), monetary compensation ensures a low rejection rate. This was indeed a contributing factor that led to the low refusal rate observed by the authors. However, the authors observed that monetary compensation was not the only factor that resulted in a low refusal rate. Rather, explaining the purpose of the project, pledging to ensure the confidentiality of all personal information collected and having the interviews conducted with someone whom the respondents trusted were also critical factors.

After each interview, the enumerators proceeded to the first author's office to key in the necessary data. All enumerators were required to submit all data and survey forms to the first author before leaving his office. The survey forms were locked up in a drawer and the data was stored in a computer encrypted with a password that only the Primary Investigator (PI) and co-PI have access to.

Due to the sensitive nature of this study, the first author applied for and received full ethical approval by Nanyang Technological University (NTU). However, we also requested for a waiver of informed consent. This differs from Appleyard *et al.* (2016) and Rowlingson *et al.* (2016), where informed consent was used instead. Borrowers revealed to us that respondents generally would not sign any such forms because they

are guarded and want to minimise the risk of having their names being revealed in the paper. Therefore, the authors decided that verbal consent obtained before the start of the interview would suffice. Thus, before the start of any survey, the enumerators made sure to obtain the respondent's verbal consent before commencing.

Furthermore, to ensure the highest possible quality and accuracy of the data provided, respondents were compensated an extra S$10 if they could provide physical evidence of the claims that they had made in their survey. Evidence could include diaries, repayment schedules and text messages with the lender. This reduces the need to have a pair of enumerators during the interview session and minimises the risk of recall errors.

E Additional Tables and Figures

Table A6: **Reported Crime Statistics on Unlicensed Moneylending Market in Singapore (2008-2015)**

Year	Overall Crime Cases	Overall UML and Harassment Cases Reported	Number of Harassment where property was damaged
2008	33,113	11,789 (36%)	-
2009	33,186	18,649 (56%)	-
2010	33,152	16,834 (51%)	-
2011	31,508	13,342 (42%)	-
2012	31,015	10,840 (35%)	-
2013	29,984	8,306 (28%)	5,176
2014	32,315	6,553 (20%)	2,772
2015	33,608	4,873 (14%)	1,784

[1] Source: Data.gov.sg (2016)
[2] The percentage in the 3rd column is the share of total UML and UML harassment related crime cases in overall crime cases.
[3] We use "-" to indicate information not available.

Figure A1: Total Number of UML and Harassment Cases Reported (1998-2009)

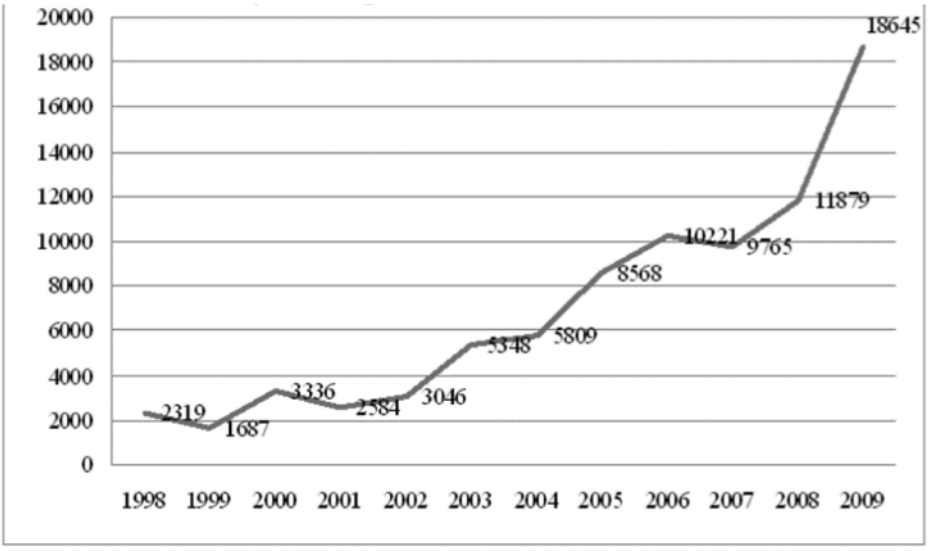
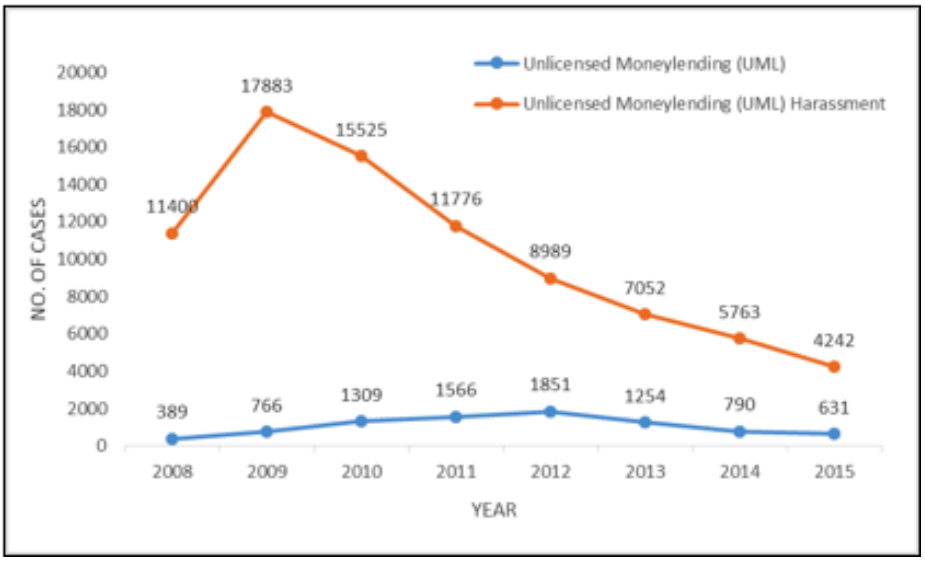
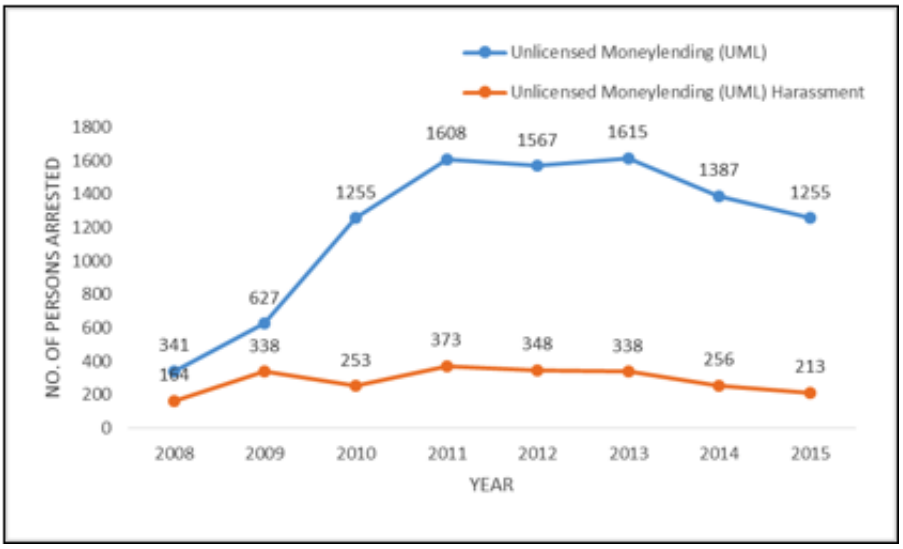


Figure A2: Number of UML and Harassment Cases Reported (2008-2015)



Blue line exhibits the reported cases related to UML market, excluding harassment related cases; The orange line exhibits the reported case related to harassment in the UML market only.

Figure A3: Number of UML and Harassment Related Arrests (2008-2015)



Blue line exhibits the reported arrests related to UML market, excluding harassment related arrests; The orange line exhibits the reported arrests related to harassment in the UML market only.

Table A7: **Changes in Probability of Finding a Lender**

Year	Agreed to Loan Asked (New) γ	Agreed to Loan Asked (Regular) θ
2009	0.31	0.65
2010	0.28	0.64
2011	0.28	0.67
2012	0.27	0.68
2013	0.19	0.55
2014	0.06	0.77
2015	0.06	0.14
2016	0.05	0.15
Total	0.21	0.58

[1] Column (2) presents the probability that a lender agrees to lend the amount or more the borrower asked only using the sub-sample where lenders and borrowers are new match.

[2] Column (3) presents the probability that a lender agrees to lend the amount or more the borrower asked only using the sub-sample where lenders and borrowers are repeat match.

Figure A4: Distribution of Lender's (mean) Markup Over Time

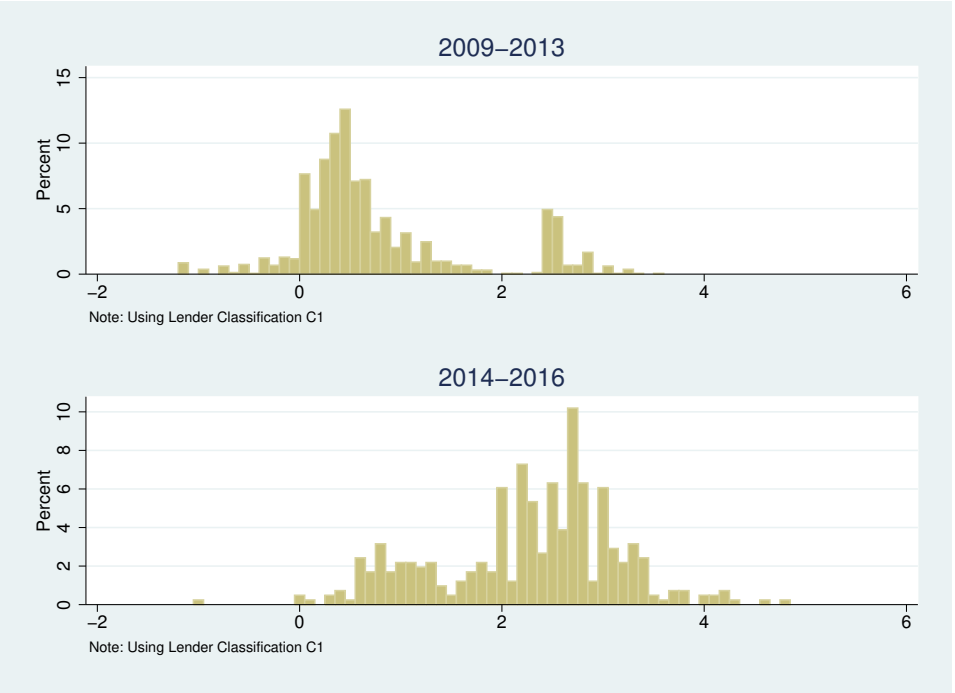


Figure A5: Distribution of Std Dev of Lender's Markup Over Time

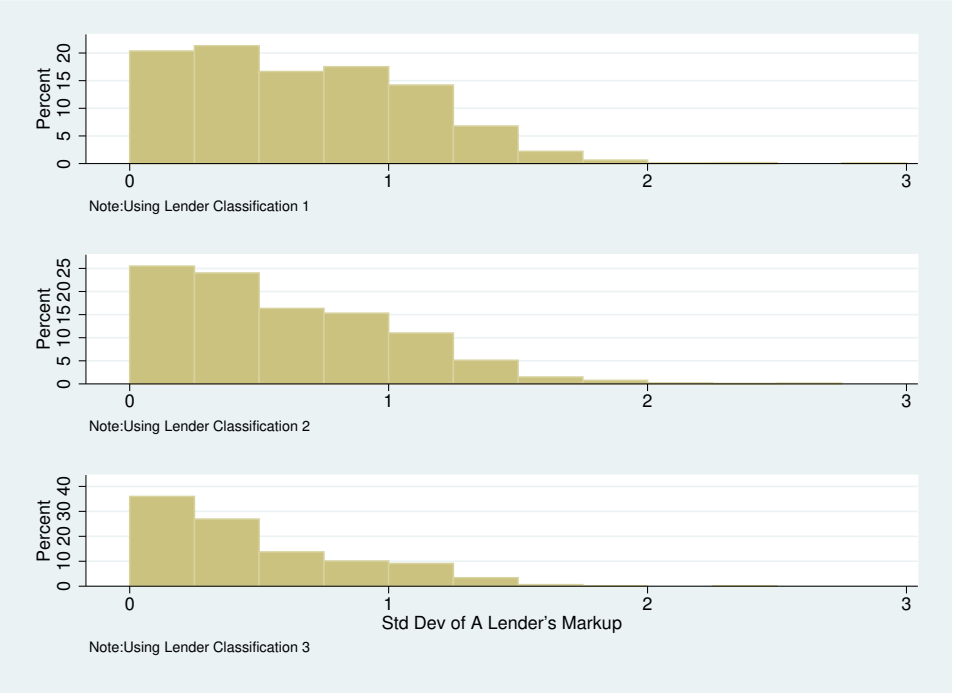


Table A8: **Lender's Markup and Borrower's Recurrent Borrowing (Always Stayers Only)**

	Year 2009-2013 (1)	Full Sample (2)
Markup	-0.570**	-0.003
	(0.253)	(0.068)
Harassment by Most Forceful Way (Base=0)		
1	0.577***	0.444***
	(0.109)	(0.144)
2	0.224	-0.529*
	(0.272)	(0.283)
3	-0.083	-0.058
	(0.154)	(0.211)
4	-0.365	-2.047***
	(0.408)	(0.464)
5	0.308	-0.208
	(0.458)	(0.702)
Log Loan Amount	0.474***	0.580***
	(0.114)	(0.143)
Interest Rate (6 weeks)	-11.149***	15.751***
	(2.423)	(1.335)
Loan Amount Asked or More	0.880***	1.077***
	(0.096)	(0.123)
Repay Month	-0.405***	-0.503***
	(0.100)	(0.050)
Borrower's Characteristics	Yes	Yes
N	5626	7468
R^2	0.243	0.164

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[1] Only subsample of always stayers (lenders) are used for estimation in this table.
[2] Lender is identified according to classification C1.
[3] We use standard error clustered at lender level using classification C1.

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