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CAN USURY EXIST AT THE ZERO LOWER BOUND?**

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Raffaella Barone¹ and Donato Masciandaro²

Abstract

In advanced economies, the recent collapse of interest rates to the Zero Lower Bound (ZLB) has triggered a series of research questions on how to navigate the new zero-interest credit environment. Focusing on illegal markets, it is possible to explain why usury still remains widespread after the legal nominal interest rate has fallen to zero. If the lender is a criminal agent with money-laundering aims, the ZLB isn't an obstacle to design and implement usury contracts. Using a dynamic model of usury for a loan having a variable interest rate and the value of the borrowing firm itself as collateral it is possible to show that notwithstanding the ZLB the criminal actor can be able achieve the money laundering purpose by expropriating the borrower of his/her collateral.

JEL CLASSIFICATION NUMBERS: K40, K42, K14, G18.

KEYWORDS. ZERO LOWER BOUND, MONETARY POLICY, BANKING REGULATION, CREDIT MARKETS, USURY LAW, MONEY LAUNDERING

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1. Introduction

In advanced economies, the recent fall in interest rates to near zero (the so-called Zero Lower Bound, ZLB) has prompted a string of research questions on how to best navigate the ZLB credit environment. Focusing on illegal markets, can usury still exist when the legal nominal interest rate approaches the ZLB? This paper shows that if the lender is a criminal player and the credit channel is a money laundering tool, then the ZLB is not an obstacle to the implementation of usury contracts. We propose a dynamic model with an embedded mortgage plan at a variable interest rate. This rate is a function of time and influences the probability for the criminal actor to implement the money laundering operation via expropriation of the collateral.

Since 2008, in almost all advanced economies central banks have designed and carried out very aggressive monetary policies in order to fend off the Great Crisis. The severity of the recession forced central bankers to come up with conventional and unconventional tools so to generate a macroeconomic turnaround³.

Central banks dealt with the crisis in differing ways: the Fed cut its policy rate from 5.25% to 2%, whereas the ECB and the BoJ kept their discount rates unchanged. In 2009 interest rates were cut until they were at or near the ZLB (Zero Lower Bound). Major central banks started to buy securities and massively expand their balance sheets. In 2010, central banks continued to cut policy rates and reinforced such an expansionary stance with unconventional policy measures to address financial markets' malfunctioning and avert economic meltdown. In 2011, central banks extended the period of monetary accommodation; the end of unconventional policies was further delayed. In 2012, almost all advanced economies maintained extraordinarily expansionary monetary policies, which were transmitted to emerging market economies in the form of exchange rate and capital movements. Monetary accommodation is thus a global phenomenon and ultra-cheap money is likely to continue in the next tow years, notwithstanding the gradual tapering of the central bank's asset purchase that was announced in the first months of 2017, in the United States, in Europe, and the UK as well.

In the legal credit market, the consequence of accommodative policy was a growth of bank loans to enterprises and families. In some European countries as Germany, Spain and Italy, conditions for granting credit (such as, for instance, loan maturity and loan size) become easier, but less so for riskier borrowers⁴. At the same time, European non-performing loans (NPLs) became more sizable than either the United States and Japan; at the end of 2016 NPLs were 5.1% of the total, a high value, although decreasing, considered they lower than 2015 and 2014 when they were at 5.7% and 6.5%, respectively⁵. Therefore, given the well-known negative relationship between NPL and economic growth⁶, it is difficult to establish for how long time banks will be able to sustain this low interest rate policy without irreversibly undermining bank profitability⁷.

³ On the unconventional monetary policies see among Ball et al. 2016, Borio and Hofmann 2017, Borio and Zabai 2016, Den Haan 2016, Gertler and Hofmann 2016, Orphanides 2017.

⁴ ECB (2017), pp. 8-9.

⁵ Magnus, Margerit, Mesnard, Katopodi (2017).

⁶ See Coeuré (2016) and Magnus et al. (2017).

⁷ Praet (2016), Monetary policy and the euro area banking system. Speech by Peter Praet, Member of the Executive Board of the ECB, at ECMI Annual Conference, Brussels, 9 November 2016, EUROSYSTEM

What are the consequences of such as extraordinary monetary environment on illegal credit markets? And a related question arises: is usury and the corresponding legislation still a relevant issue in advanced economies?

Over the last few years, economic literature has focused on usury law and the effects of capping interest rates on both the lender's and borrower's behavior. Those contributions were based on the traditional approach according to which the usury contract has the same *qualitative* characteristics of a bank contract, except for tighter quantitative requirements. Anyway, very few scientists studied the circumstance that the lender could be a criminal that uses the credit market in order to reach his/her money laundering purposes. Yet as judicial reports refer, the turnover of usury and illicit markets in general reach huge amounts. Just in Italy the institutional estimations of usury profits amount to almost €45 billion in 2015, while between 2011 and 2012 the usury market turnover was approximately equal to €15-18 billion. Therefore, it is a constantly growth phenomenon that needs a careful attention in order to implement an effective counter action.

Taking the distance from the traditional approach, in this paper we consider the usury contract as being *qualitatively different* from a bank contract thanks to some imperfections whose nature is external to credit markets. In particular, we proved that if the lender is an illegal creditor an environment characterized by low interest rate doesn't affect the agreement of a usury contract.

In this case the borrower could make use of an illegal lender because s/he is rationed on legal credit market or for other opportunistic reasons, including a shorter procedure to receive the expected loan. From the usurer's point of view, profits are directly related to the borrower defaulting on the loan. Indeed, in such an event, the borrower loses the collateral and at the same time the lender achieves his/her illegal purpose, i.e. using the loan guarantee as a money laundering instrument⁸.

We proposed for the first time a dynamic model of money laundering through usury. It embeds a mortgage plan featuring a variable usurious interest rate. This rate is a function of time, and it influences the likelihood that the usurer will end up with the collateral. At the beginning of the contract, the interest rate applied to the borrower could be lower than the interest rate cap fixed by usury law. Then, the usury rate increases exponentially, making the loan repayment less and less likely. So a point in time is reached when the borrower either decides to denounce the illegal lender or gives up his/her personal guarantee.

This paper is organized as follows: in section 2, there is an overview of usury and interest rates pointing out the main differences between two different approaches in the usury market and the legal credit market; in section 3, a summary of the literature on the traditional approach to usury is presented; section 4 proposes a short review essay on money laundering and usury, with some empirical contributions about estimates of usury; in section 5 we propose the model linking crime, money laundering, usury and interest rates. Section 6 contains our conclusions.

2. Usury and Interest Rates: The State of the Art

Is the usurer just an illegal banker? Economic literature generally gives a positive answer to this question, as it does not identify any specific feature to differentiate the market for usury from any other credit market⁹.

⁸ For a detailed review essay on money laundering see Masciandaro et al (2007), Unger (2007), Barone (2017).

⁹ See among others Basu (1984).

The usurer offers a debit contract with the *same qualitative characteristics* of a standard bank contract, with the exception of imposing heavier conditions from a *quantitative* point of view. Those who are forced to accept such an unfair contract have previously been rationed by the banking system due to imperfect information and competition. Therefore, we can say that the main difference between usury and a bank contract lies in the different interest rate they embody, so that usury can be deemed as the consequence of some imperfections internal to legal credit markets. The usury contract is a consequence of a rent-seeking situation.

The present work adopts a different approach¹⁰ and considers the usury contract as being *qualitatively different* from a bank contract due to imperfections whose nature is external to credit markets and depends on the inefficient protection and transfer of property rights. In a system where the protection and transfer of property rights are imperfect, the value of goods and properties liable to represent a security for loans depends on the “technology” the credit supplier can use in order to get the money back.

The specificity of usury credit can be found in the different (illegal) “technology” adopted in credit collection and consequently in a different evaluation of the debtor’s assets and future income profiles.

In such terms, usury can be said to depend on the gap between the legal credit supplier’s technology in credit collection (judicial coercion) and the usurer’s one (illegal compulsion). Therefore, the clauses (especially the interest rate) of the agreement between the credit supplier and the recipient should not be viewed as the main characterising elements, but as external consequential elements of a different relationship existing among the counterparts. Economic literature, on the contrary, usually regards the distinctive features of usury (especially higher interest rates) as exogenous elements, and consequently focuses on how such elements affect the behavior of economic operators¹¹. Moreover, some social scientists have pointed out that under certain circumstances, legal lenders could be induced to violate anti-usury laws.

In the following subsection we show this event and provide a survey of recent literature on the usury contract, based on the traditional approach. The anti-usury law analysis has been carried out mainly for the U.S., Great Britain, and France.

2.1. The Standard Approach

As mentioned above, sometimes it is possible that legal credit markets operators behave in an illegal manner. In particular, Bodenhorn (2005) highlighted the point that although the aims of usury laws are to protect small borrowers, reduce market power, prevent immoral behavior and positively affect the allocation of resources, the imposition of a usury threshold, i.e. an interest rate ceiling, can distort markets without reaching the desired purpose. In particular, the author showed that under certain circumstances banks may choose to violate the law, if the expected return exceeds the expected cost of illegal behavior, which consisted in the violation of the usury interest rate ceiling. The expected benefit was the usurious interest rate (given by the legal rate plus a variable x which is distributed according to a density function and a cumulative distribution function) multiplied

¹⁰ The adopted approach has been introduced in Masciandaro (1997) and developed in Cifarelli et al. (2002) and Masciandaro (2002).

¹¹ See Blitz and Long (1965), Boyes (1982), Brucker (1977), Crafton (1980), Glaeser and Scheinkman (1998), Greer (1977), Ostas (1976), Peterson (1977), Robins (1974), Villegas (1982).

by the value of the loan less the legal interest rate times the loan. The expected cost was the penalty for noncompliance with the law corrected for the banker's probability of sheltering him/herself from prosecution. This cost depended on the likelihood of the borrower to sue for violation of usury laws. The main result reached by data analysis shows that between November 1845 and April 1859, several American banks regularly violated the law. The borrowers didn't sue the lenders because they didn't want to end the long-term relationship they had, or expected to have, with the lending bank.

Subsequently, Barone and Olivieri (2015) showed that the derivatives market had been used to escape the strictures of usury laws. He reminded that this habit was already known in the past century, at the time of Russel Sage (1816-1906) who was accused in 1867 of being the leader of a usury band because he lent money at usurious rates. Thereafter, he used options to camouflage loans at usurious rates by means of a stock purchase order, sale call and purchase put. According to the authors in order to identify usurious behavior, the value of the implicit option should be consistent with prevailing market conditions.

Later, other authors analyzed the relationship between anti-usury law and banking products such as payday loans and credit cards.

Peterson C.L. (2008) in his article try to reply to some questions on American usury law. He started from an unusual circumstance. Precisely, although usury law had capped interest rates for a long time, in recent years payday loans, whose principal characteristic was their very high interest rate, have boomed. The author posed this question: was there a change in usury law that had made possible the increase in payday loans? Indeed, which were the features of the law in general and of consumer law in particular? What lessons could policy makers and the public draw from such evaluation of usury law? He analyzed data on usury law and payday loans relating to two single years – 1965 and 2007 – covering all fifty states' usury laws. First of all, he tried to even out the terminology of usury law adopted by each state in order to compare different prices¹² of various payday loans. For this purpose, he evaluated the most expensive payday loan in each state¹³. Then, he transformed these prices in an annual percentage rate according to the Truth in Lending Act (TILA). Later he estimated the distortion between the price expressed in the state's usury law and that calculated according to the TILA rule. This distortion grows over time. In the analysis the author underscored the fact that across the span of time usury law had become more lax¹⁴, in particular in regions outside the Northeast, with Mountain West topping the list with an annual percentage rate reaching a staggering 652%. Two states in particular, Idaho and Utah, have deregulated their maximum loan price. Indeed, in 2007 usury law appeared more geographically uneven than in past decades. The author justified this result ascribing it to a difference in pro- or anti-government stance in economic matters. Instead the influence of the riskiness of the borrower doesn't seem to have been considered.

Littwin A. (2008) analyzed the desirability of usury law for credit cards. To this purpose, the author interviewed fifty low-income mothers with children. The sample used the so-called *snowboard* technique. Even if the interviewed women didn't appear to be rational according to traditional economic theory, however they revealed a good awareness of the varying riskiness of credit card products. The questionnaire assessed the advantage for lower income families to impose a limit to the interest rate paid on credit cards (in other

¹² The price includes the interest paid on the loan, plus fees and closing costs.

¹³ The typical payday loan appears to consist of a cash advance of \$325 for fourteen days.

¹⁴ Just for example, in 2007 35 states allowed lenders to charge 300% on a typical payday loan.

words a return to the usury cap restriction), with the awareness that a lower credit price would have reduced their likelihood of getting credit. Instead to provide just an answer, the women suggested two possible solutions for how these card products could be designed to meet their needs. The first idea was to impose a restriction to their own propensity to consume by selecting a prepaid card, so to reduce the borrower's purchase temptations. The second solution consisted of several arrangements that could reduce riskiness for this typology of borrowers: imposing a limit on credit card availability; charging a fixed credit card fee to be added to interest rates on the loan; an installment-payment credit card.

Moreover, the author suggested another solution based on an adjustment of the opt-out technique used for screening proposals. This change would allow people to receive only safe credit card plans. However, the limit of this article, as the same author admitted, was to restrict the interview to a limited number of women. Therefore, the answers could be influenced by a gender factor. Moreover, the credit profile of these women was not clearly specified.

Temin P. and Voth H-J. (2008) studied the effects of the British usury law of 1714, making use of data on hundred loan transactions collected from a private London bank. The main borrowers of Hoare were noblemen, officers, church officials, wealthy traders. In the article, he observed that the usury law acted as a means of rent extraction.

He used an empirical analysis to test the effects of lowering the interest rate ceiling. The interest on loans dropped from 6% to 5% after the usury law of 1714. Moreover, another characteristic of the loans were their duration, which ranged from one day to 38 years. Almost the 50% of all the loans were against collateral. The possible results of the decreasing trend in the interest rate could be different according to three approaches. If the prediction of usury law as a means of social engineering was true (Glaeser and Scheinkman, 1998), then a wider access to credit was expected as consequence of a decrease in usury rate ceiling. Otherwise based both on Shaw's (1973) and McKinnon's (1973) view, who considered the interest rate limit as signal of financial system malfunctioning, a lower interest rate ceiling should have produced lower efficiency. Financial intermediaries would be induced to deny loans to those borrowers that were riskier but also needier. Finally, the authors tested if setting a usury interest rate limit had no significant effect. The main results were that the Glaeser's and Scheinkman's approach didn't hold. As a result of the usury law, the riskier borrowers were not funded and at the same time the use of collateral increased over time. Moreover, the author noted that the reduction in the usury interest rate ceiling was not a consequence of the fall in the market rate, either.

An interesting perspective is provided by Ashta A., Attuel-Mendès L., Ditter J.G. (2011) who pointed out a paradox of the French usury law. They tried to explain the possible rationale for the failed increase in interest rate charged to borrowers by banking lenders as consequence of the abolition of the usury law. Precisely, in 2003 and 2005 French government deleted the usury law for companies and individual firms, respectively, except for overdrafts. Notwithstanding, the expected result (i.e. an increase in the interest rate on regular and microcredit loans) didn't occur. The authors suggested three possible answers to explain this paradox: the first was an economic explanation; the second were both behavioral and formal institutional reasons; the third was based on a cultural approach. According to the economic theory, interest rates didn't increase because of a global reduction in interest rates due to the greater amount of capital available. Moreover, they suggested that the paradox could be due to an increase of the money supply and stronger competition in the banking industry. Among the behavioral and institutional explanations, a key role was played by the guarantees offered by OSEO (i.e. a French public institution

providing collateral to small and medium firms). The interest rate applied to a loan was decided by OSEO, whose aim was to recover the principal, so it was not interested in setting a high interest rate. At the same time the borrower would be more responsible with a low interest rate. The bank could also prefer to be paid a lower interest rate if it was able to reduce the risk of default thanks to the existence of a public guarantee. In addition to these reasons, religious principles and risk aversion could have influenced the behavior of traders.

Later, Rigibi (2013) studied the effects of usury laws using data from a U.S. online lending marketplace. The author exploited the increase in interest rate cap applied on 15 April 2008 to loans made through the Prosper online platform¹⁵. Until 15 April 2008, the interest rate cap was fixed by state's usury laws, ranging between 6% and 36%. After this date, Prosper changed the cap setting it at 36% for all states except Texas. In order to analyze the effects produced by this interest rate change, and reduce the eventuality of a time trend effect, the author considered a narrow time-window going from 15 March 2008 to 15 May 2008. Subsequently the author analyzed the effect of an increase in the usury interest rate cap for every state and for borrowers with differing classes of risk. The main result of this analysis was that the increase in the interest rate favored borrowers. In particular, the probability of funding for low-risk borrowers didn't change, whereas it changed for high-risk borrowers; the price paid by each borrower didn't grow so much as a consequence of the increase in the interest rate cap; and the probability of default was the same for each borrower belonging to a given risk category. Finally, the annual percentage rate (APR) decreased only for high-risk borrowers.

The advantage of this contribution with respect to previous work on usury law is that the author considered all information available to lenders. Nevertheless, the analysis just focused on consumer loans, dealing with small loans reaching a maximum amount of \$25,000.

While the literature surveyed until now mainly evaluates the opportunity of an anti-usury law from the borrowers' point of view, Burke J. (2014) analyzed the Zero Interest Rate Policy (ZIRP) of the Fed in light of the Scholastic teachings on usury¹⁶ from the lenders' point of view. He was inspired by Noonan's book, *The Scholastic Analysis of Usury*. According to the Scholastics' moral theology, while there was no *intrinsic* title to demanding an interest on a loan, there were at least three *extrinsic* reasons that justified the additional fees and interest due to the lender. Those were: *lucrum cessans*; *damnum emergens*; *periculum sortis*. The first concept was equivalent to opportunity cost in neoclassical economic theory. The only difference consisted of the nature of the next best alternative, which in the case of the opportunity cost is between all uses of money, while in *lucrum cessans* referred to the next best alternative investment. The *damnum emergens* included the cost of inflation and other costs such as the risk of a bank or other financial institution being run. Finally, *perriculum sortis* referred to compensation for the risk of default. Afterwards the author pinpointed the correspondence between Scholastic teachings on usury and neoclassical economic theory, and raised doubts about the ethics of ZIRP pursued by the Fed. A zero interest rate required that at least one of the extrinsic titles will be negative. Only *damnum emergens* could be negative, if there was a deflation so great to offset the two other costs. Nevertheless, since 2003 inflation has been positive and, in particular, from July 2012 to July 2013 it was 2.0% according to the Bureau of Labor Statistics (BLS). The author concluded that interest rates were unjustly too low and

¹⁵ "Prosper.com is the largest marketplace lending platform in the United States. See their web page for other details: <https://www.prosper.com/plp/about/>

¹⁶ He was inspired by Noonan's book *The Scholastic Analysis of Usury*.

that the ZIRP was the opposite of usurious rates, harming the lender rather than the borrower. Although the ostensible aim of the low interest rate policy adopted by the Fed at the beginning of the recession was to make access to credit easier for businesses and entrepreneurs, due to the general atmosphere of uncertainty, banks were still reluctant to lend.

2.2. Money Laundering and Usury

The literature cited in the previous section doesn't consider the relationship between credit markets and criminal agents. Yet, other things being equal, the peculiarity of the usury loan can lie in its effectiveness in implementing money laundering operations¹⁷. In a recent article Unger (2017) observed that when the lender is a criminal, s/he could decide to loan money at a very low interest rate in order to launder dirty money. In this way, he not only can escape the reporting threshold, but especially to take possession of the collateral. Indeed, as Masciandaro (2000) pointed out, when organized crime grants a loan is not really interested in the repayment of debt, since it aims to seize the collateral in replacement of the loan. In this article, the author, through a theoretical model, examined how organized crime took advantage of entrepreneurial distress, describing the process as going through three phases, summarized by a metamorphic metaphor: the white caterpillar; the grey chrysalis, the black butterfly. At the beginning of the process, organized crime approaches a company with requests for extortion. Then, in a second phase, the usurer offers a loan to the extorted firm. The aim of the dirty lender is to take possession of the guarantee in order to reach his/her illegal purpose (i.e. money laundering and territorial control). The borrower could be aware of the dirty nature of the money, however the likelihood of resorting to a usurer is higher: the riskier the project that needs to be financed; the higher the value of the collateral estimated by the usurer; the higher the borrower's propensity to crime; the lower the cost of extortion. At the end of the process, in other words in the third phase, the criminal actor has penetrated the entrepreneur's management and control system, altering legal equilibria. This theoretical relationship between organized crime and business crisis has been empirically observed as well. In particular, it applies to the Italian Mezzogiorno where borrowers are characterized by a riskier profile.

Later in Masciandaro (2001), after an overview of European usury law, the author presented a theoretical model that highlighted the limits of such law according to economic analysis. He proposed a static model analyzing the demand and supply of credit in the legal and illegal markets. The borrower was an agent wishing to finance a project yielding an uncertain future income. An information asymmetry existed between the agent and the lender related to the amount: it was known to the borrower but not to the lender. There was perfect competition between legal and illegal lenders in the credit market. On the other hand, in order to be financed by the usurer, the borrower had to be willing to pay a risk premium. The dirty lender expected this amount for several reasons, for example for providing immediate liquidity, offering confidentiality, rapidity in loan procedure or because of the borrower's high riskiness. This premium took a different value according to the borrower's propensity to illegality. A further difference between legal and illegal creditors consisted in the different value assigned to the collateral offered by the agent. The bank priced this asset at less than the nominal value because of costs related to property transfer, whereas the usurer conferred it an illegal surplus value. The main results of this

¹⁷ The relationships between crime, money laundering and usury is explored in Masciandaro (1999), (2000), and Barone (2004).

paper were that the borrower prefers the usurer to a bank when the value of collateral, the surplus value assigned by the illegal lender, and the project's riskiness are all higher. Moreover, this proposition holds the lower the illegality costs and the higher propensity to criminal pollution are for the borrower.

Later the author evaluated the role of renegotiation, considering an intermediate step in which the lender could either decide to carry the contract forward renegotiating the loan, if s/he received an adequate payment, or interrupt it and bring the borrower to bankruptcy. The choice for the agent to make recourse to a legal as opposed to an illegal lender depended on the expected payoff at each period. Once a decision had been taken, it was impossible to modify, so actors had to behave strategically.

A few years later, Barone (2004) showed an economic model of money laundering by means of usury, although it was still static. The study was not based on an optimization mechanism of the enterprise that committed criminal activities, but just observed the equilibrium of the firm, both in certainty and uncertainty conditions, in other words, taking into account the risk to be discovered and convicted. Notwithstanding, this latter event was more mathematically complicated but didn't bring any advantage in terms of results. The main result of the model was that the usury interest rate of the loan could be cheaper than the legal rate. This is the consequence of the usurer's money laundering purpose.

Dalla Pellegrina (2008) analyzed the effects of the changes in interest rates and bank credit supply on usury for Italian provinces over the 1999-2002 period. In particular, she evaluated under which conditions an informal lender could behave as an illegal creditor offering a loan with an interest rate higher than the cap fixed by law. The demand side of informal contracts was composed of bank-rationed agents. The probability to be rationed and therefore involved in usury increased with judicial inefficiency, which was treated as an exogenous factor. On the supply side, the informal lender could prefer to remain legal when the bank rates increased since the profit that obtained fixing an interest rate equal to the cap increased, and usury supply decreased. Other variables included that influenced the supply and demand of usury were: economic variables (the rate of unemployment and per capita income); demographic factors (population density); availability of cheap credit (governmental low-cost financing supply); social variables (the level of social participation and primary school dropout rate); banking variables; sanction variables; the incidence of organized crime. The main results suggested a negative relationship between the incidence of usury crime and global interest rates, as well as with bank loans availability. Moreover, a negative relationship existed between usury crime and banking variables (with the significant exception of interest rate and credit amount), as well as between usury and social participation.

In Barone et al (2012) the authors dealt with a stochastic dynamic optimization problem in order to identify the level of the interest rate that a usurer should charge a company in order to bring it to bankruptcy but, at the same time, secure a maximum value for its collateral. It was assumed that the company in need of finance was also the collateral offered by the borrower to the lender. The value of the firm could change over time ranging from 0 to a maximum amount of K . In the latter state the company was able to repay its debt, while when the net wealth of the firm reached the value of 0, there was business failure. The stochastic dynamics associated to the wealth of the firm was given by a controlled stochastic differential equation. The value of the guarantee was related to the wealth of the firm and it included the future income obtained by the lender in the case of failure. An endogenous time threshold was introduced. This value pinpointed the moment in which the failure of the firm could be profitable for the lender, in order to reach his/her own money laundering purposes. The analysis was performed via simulation studies. By

means of a Monte Carlo simulation, 1000 different trajectories of the firm's value were built, considering three typologies of firms: small, medium and large. The main results of the analysis were that: 1) the level of interest rate that best allowed the illegal lender to pursue his/her purpose was very high and close to the upper bound of the interest variation range; 2) the optimizing interest rate increased with the firm's size; 3) the probability that the value of the guarantee was positive when the borrower went bankrupt increased with the interest rate; 4) as the interest rate increased, the average time during which the borrower was in default decreased. Even if such model could be interesting, as noted by the authors, the formalization of a model that describes this framework had not yet been achieved.

Some recent empirical studies have tried to estimate the usury phenomenon. Scaglione (2014) offered an assessment of the usury market in Italy for 2012¹⁸. The data were collected by the Italian National Institute of Statistics (Istat) for information on the production structure, and by the National Observatory of Commerce of the Ministry of Economic Development for the commercial activities. Indeed, in order to estimate the number of firms rationed by the legal market, the author used evidence coming from surveys on credit access for manufacturing firms wishing to invest compiled by the Bank of Italy. The overall number of rationed firms amounted to over 873,000 units, of which commercial activities were about 260,000. The percentage of companies rationed in the legal market and consequently involved in the usury market totaled to 41% (equal to 254,492). This value was calculated by means of the usury risk index developed by Eurispes (2011). Total turnover for the Italian usury market amounted to approximately €18 billion. The phenomenon was more developed in Campania, followed by Sicily, Apulia, Lazio, and Lombardy with over €1 billion. Respect to the estimates provided by other institutions¹⁹, those offered by Scaglione were lower. However, he estimated the size of the usury market for firms, not for households. Therefore, his analysis provided a partial measure of the usury phenomenon. Indeed, this is a very rough estimate, not based on a model sufficiently detailed to depict the facts.

Marinaro (2017) focused on the strengthening of organized crime's participation in the money-lending sector and the appropriation of homes and business assets as consequence of the financial crisis in Italy. In particular, her study observed the case of the illegal credit market in Rome, answering the following questions: "What are the determinants of usury demand in Rome? Has the economic crisis played a role? What factors contribute to the scarce propensity to report to public authorities? Is there an alternative to illegal credit markets?". The analysis was performed by means of interviews with three entrepreneurs victims of usury, integrated with other interviews and discussions held with members of four of the five main NGOs active on the problem in Rome. This study suggested that the causes of widespread resort to the illegal credit market were systemic, and that Italian businesses, and Roman businesses in particular, had resorted to loan sharks prior to the economic crisis, so that the problem was deep-rooted. Therefore, structural changes were needed to improve the situation.

As previous literature showed, only in Barone (2004) a model of money laundering by usury was presented. However, this model was static and so it was not able to provide neither time-series observations nor predictions of the usury phenomenon.

¹⁸ Previous estimates of usury market were offered by Guiso (1995) and Goisis et al. (1999). However, the limit of these studies was that they were restricted to Italy, narrowing their international scope.

¹⁹ Transcrime (2013) calculated annual revenues for €2.2 billion, while SOS impresa (2010) reported €15 billion. These estimates are extracted by Marinaro (2017).

3. Money Laundering, Usury, and Interest Rates at the Zero Lower Bound

We assume that, in a given region, a criminal organization has committed a crime obtaining an illegal monetary return of D_0 from such activity. Nevertheless, the use of this revenue is not a free lunch, because of the probability to be discovered and convicted for the crime perpetrated. Therefore, the mob seeks to launder dirty money. Among several money laundering techniques, a common one used by organized crime is usury credit.

For a given amount of dirty money, the criminal decides the share to be laundered. We define y such percentage. The cleaned money W could be used in the legal market minimizing the risks to be exposed and convicted. The remaining $(1 - y)D_0$ will be reinvested in the illegal sector.

Money laundering is not a zero-cost activity. The literature provided information regarding the technological cost of money laundering activity. It seems that such cost roughly amounts to 5-15% of dirty money that needs to be laundered²⁰. In the particular case of usury credit, the cost is represented by the share of dirty money and interest that was lent but not paid back, and by the risk of being accused by the borrower. Therefore, at time t_1 , assuming that the borrower pays off the loan according to an amortization schedule with a variable interest rate (usurious rate), the cleaned money will be:

$$W_1 = \frac{yD_0}{n} [1 + nr_{u(0)}]$$

where n is the hypothesized duration of the loan.

The laundered money is be equal to the principal that has been repaid and usurious interest. Nevertheless, the advantage of the usurer respect to the formal lender is due to the value of the collateral G , which plays a decisive role for money laundering purposes. The collateral has a different value for the bank and for the usurer. The costs of liquidating the asset are higher for a bank, than for an usurer²¹. The guarantee is often represented by the same company that receives the loan and for organized crime this has an intangible value as it can be used for money laundering purposes²². Therefore, the cases are two. With probability a , the borrower pays off the loan plus the interest $r_u(t)$; while with probability $(1 - a)$ s/he could lose the collateral (with probability p), or s/he will report the lender to the police. Nevertheless, only occasionally the victim accuses the usurer²³. The probability that the borrower loses the guarantee is greater the higher the usurious rate. This rate is time-dependent. In particular at the beginning of the contract it could be lower than the legal interest rate²⁴, but after some it is bound to increase will. Therefore, generally a typical usurious contract implies a short-time loan.

The cleaned money is spent on consumption goods for a share $(1 - \eta)^{25}$ while the remainder is invested in the legal sector at the legal risk-free interest rate²⁶.

²⁰ Reuter and Truman 2004.

²¹ Bester (1994) shows that the optimal contract for a bank is a loan wit no personal guarantee. Under suchcontract, the borrower pays a higher interest rate on funds loaned, but if s/he defaults, s/he doesn't lose any collateral. Nevertheless, in order to be conservative, we will assume a banking contract that requires collateral.

²² We assume that, at the beginning of the contract, the guarantee's value is higher than the initial loan.

²³ See EURISPES (2016) pag. 41.

²⁴ Unger (2007a)

²⁵ According to Unger (2007a) p. 152, the percentage of laundered money spent on consumption goods is equal to 11%.

So in the second period, legal capital accruing from legal investment, will be:

$$F_1 = a_1 S_1 + (1 - a_1)[\rho G + (1 - \rho)\emptyset]$$

where:

$$S_1 = \eta W_1 (1 + r_i)$$

$$a_1 = \frac{1}{1 + r_{u(0)}^2}$$

while in general it is:

$$a_k = \frac{1}{1 + r_{u(k-1)}^2}$$

with:

$$r_{u(k)} = r_{u(0)} e^{\ln(1.08)k}$$

At the same time, the share of illegal capital reinvested in the illegal sector before being laundered produces additional illegal capital.

$$D_1 = (1 - y)D_0(1 + r_i)$$

Later, a share y of this additional illegal amount will be laundered, always by means of usury credit:

$$W_2 = \frac{yD_1}{n} [1 + nr_{u(0)}]$$

Hence, thereafter legal assets will arise from three sources: the share of starting illegal capital which was laundered in the first period and later invested in the legal sector; the second mortgage payment on the first loan, and, finally, the share of illegal capital immediately reinvested in the illegal sector and in the second period laundered to be consumed and invested in the legal market.

In other words, we will have:

$$F_2 = a_2 S_2 + (1 - a_2)[\rho G + (1 - \rho)\emptyset]$$

with:

$$S_2 = S_1 + \eta(1 + r_i) \left\{ W_2 + \frac{yD_0}{n} [1 + r_{u1}(n - 1)] \right\}$$

Therefore, in general we have:

$$F_k = a_k S_k + (1 - a_k)[\rho G + (1 - \rho)\emptyset]$$

with:

²⁶ A person who wishes to launder dirty money has the possibility to invest it in capital markets. Indeed, in order to minimize the risk of losing money, s/he generally prefers risk-free forms of investment such as bonds, or other low-risk assets. (See Unger 2007a).

$$S_k = \eta(1 + r_l) \frac{yD_0}{n} \left[\frac{1-q^k}{1-q} \left(-\frac{q}{1-q} + \frac{\eta r_{u(0)}}{1-b} - \frac{r_{u(0)}b}{(1-b)^2} \right) + r_{u(0)}b \frac{b^k - q^k}{b-q} \left(\frac{b}{(1-b)^2} - \frac{n}{1-b} - \frac{q}{(1-b)(b-q)} \right) + k \left(\frac{r_{u(0)}b^{k+1}}{(1-b)(b-q)} + \frac{1}{1-q} \right) \right]$$

,

where:

$$b = 1.08$$

$$q = (1 - y)(1 + r_i)$$

Let us suppose that every period contains a time interval h ; therefore, the difference (ΔS) between two successive steps is given by:

$$\Delta S = \eta(1 + r_l) \frac{yD_0}{n} \{ q^k(1 - q^h)(c_1 + c_2) + c_2b^k(b^h - 1) + kb^k(b^h - 1)c_3 + hc_3b^{k+h} + hc_4 \}$$

Where:

$$c_1 = \frac{1}{1-q} \left[-\frac{q}{1-q} + \frac{\eta r_{u(0)}}{1-b} - \frac{r_{u(0)}b}{(1-b)^2} \right]$$

$$c_2 = \frac{r_{u(0)}b}{b-q} \left[\frac{b}{(1-b)^2} - \frac{n}{1-b} - \frac{q}{(1-b)(b-q)} \right]$$

$$c_3 = \frac{r_{u(0)}b}{(1-b)(b-q)}$$

$$c_4 = \frac{1}{1-q}$$

Dividing for h and calculating the limit for $h \rightarrow 0$, we have:

$$S(t) = \eta(1 + r_l) \frac{yD_0}{n} [(c_3b^t + c_4)t + c_2b^t - (c_1 + c_2)q^t + c_1 - c_2 + c_3]$$

With $S(0) = 0$.

Therefore, the cumulative legal capital produced by organized crime is equal to:

$$F(t) = a(t)S(t) - [a(t) - a(0)][\rho G + (1 - \rho)\theta]$$

where: a , the probability that the borrower will be able to pay back the loan plus interest, is a function of the usurious rate. In particular, it decreases when $r_{u(t)}$ increases; $S(t)$ is the cumulative mortgage gain which increases over time due to the variability of the usurious interest rate. As time goes on, the probability of pay-back decreases and the borrower could either report the lender or give up the guarantee. Actually, the likelihood for the perp to be prosecuted will depend on the borrower's attitude vis-à-vis the usury market. It is conceivable that it happens in regions characterized by lower usury risk.

Summarizing, at least in the initial period, that legal and illegal lenders compete in the credit market setting similar interest rates. On the demand side, the borrower could resort to the usury market for several reasons beyond the interest rate. First of all, to avoid the circumstance to be marked as a non-performing borrower. Moreover, institutional factors, unemployment, and amount of red tape are all significant.

On the supply side, the illegal lender takes advantage of the usury market with a dual aim. S/he could primarily lend money, even at ZLB, in order to escape the tax reporting

threshold, because of the dirty nature of the proceedings. Then, if s/he is able to force the borrower into bankruptcy, s/he could take possession of the collateral and camouflage it in the legal sector.

4. Conclusions

Since 2008, central banks have designed and implemented very aggressive monetary policies, by adopting conventional and unconventional tools to generate a macroeconomic turnaround in advanced economy. Monetary conditions have become highly accommodative globally and are likely to remain so for the next two years, notwithstanding the gradual tapering of QE that has been announced in the first months of 2017 in the United States, in Europe, and in the UK as well.

In advanced economies, collapse of interest rates to near zero (Zero Lower Bound, ZLB) prompts research to answer the question as to how best navigate a zero-interest credit environment. Focusing on illegal markets, can usury still exist when the legal nominal rate approaches the ZLB? This paper shows that if the lender is a criminal player and the credit channel is used as a money-laundering tool, then the ZLB does not prevent the implementation of usury contracts.

At least in an initial period, legal and illegal lenders compete in the credit market fixing a similar interest rate. Given the nature of dirty money, illegal lenders could grant credit even at interest rate close to ZLB, in order to escape the reporting threshold. Then, if the criminal agent is able to force the borrower into bankruptcy, s/he can take possession of the collateral and camouflage it in the legal sector. The borrower makes use of the usury market for several reasons, among which to avoid the possibility of being marked as a non-performing borrower and other institutional variables.

Therefore, counteracting usury means to first assess of the level of criminal pollution in a country, and then invest on the diffusion of good practices among citizens in order to increase trust in institutions.

An anti-usury law aimed only at capping interest rates has limited efficacy. In order to fight usury, we think that a policy designed to improve economic and social integration would have a stronger impact. In this respect, the so called *payment by results* contract recently introduced in Anglo-Saxon countries is a promising example. In Great Britain the first results-based contract was launched in 2010 in order to foster the rehabilitation of prisoners serving short sentences in the Peterborough prison.

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