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Financial Illiteracy and Mortgage Refinancing Decisions

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Abstract

We analyse the effect of an exogenous shock to the Italian mortgage market and we show that most households do not act rationally when it comes to take mortgage-refinancing decisions. In 2007 a new law was passed in Italy that allowed mortgagors to refinance their loans at no cost. This reform, along with the drop of interest rates occurred between 2008 and 2009, has produced a unique opportunity to refinance fixed rate mortgages with substantial gains. In spite of this economic convenience, only a minority of borrowers exercised their right. This behaviour is strongly associated with proxies of financial illiteracy.

JEL Classification: G14; G32.

Keywords: Mortgage Refinancing; Financial literacy; Household Finance.

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1 Introduction

Several studies have quite recently documented households' poor financial literacy as well as its effects over some financial behaviors. These studies highlight that inability to understand even simple financial problems leads to non-negligible losses and inefficient decisions. Some authors have also shown that financial illiteracy is highly associated with some socio-demographic characteristics, such as gender, age, income or education. In this paper we aim at shedding light on the effects of these characteristics – and the associated expected financial knowledge – over the households' ability to collect important monetary gains from exploiting the option offered by a new law passed in Italy in 2007. Unlike previous studies, where the potential value embedded in financial operations were generally quite modest, we document that roughly 95% of households do not act financially efficiently, producing an economic loss of around 8 percent of the average loan value. We also show that the likelihood of this inefficient financial behavior is strongly linked to personal characteristics that have been shown being good proxies of financial illiteracy.

Recent literature has shown a surprising low level of financial skills among households. Lusardi and Tufano (2009) document that only one-third of US population seems able to understand simple financial concepts such as interest compounding or the functioning of credit cards. Similarly, Klapper et al. (2013) report that, in spite of the massive growth in consumer borrowing, only 41% of Russian households understand interest compounding mechanism, and 46% correctly answer simple questions about inflation. A slightly better scenario is depicted by Van Rooij et al (2011), who analyze a survey conducted among Dutch households. The authors report that if the majority of respondents display some basic financial literacy – such as interest compounding, inflation and time value of money – only a minority of them clearly understand the difference between stocks and bonds, risk diversification or the inverse relationship

between bond prices and interest rates.

Likewise, there is indisputable evidence that the lack of financial knowledge produces undesired effects. Lusardi and Mitchell (2008) and Disney and Gathergood (2013) show that borrowers with limited financial literacy incur into higher cost of funding and higher fees. Lusardi and Mitchell (2008) document that one-third of charges and fees paid on credit cards are attributable to ignorance. Disney and Gathergood (2013) show that less financial knowledgeable UK borrowers hold larger portion of high cost credit, such as home collected credit, mail order catalogue debt and payday loans. Other studies show the effects of financial literacy on the level of participation to financial market – particularly the stock market – and resulting performances. Klapper et al. (2013) document that during the 2009 Russian crisis more literate investors have more likely participated in financial markets, have saved a greater portion of unspent income and have experienced important losses. Similarly, Van Rooij et al. (2011) report a larger use of stock investing among more financially literate households. Financial inability has been also associated to the risk of mortgage delinquency and has been attributed a role within the recent subprime crisis. Gerardi et al. (2010) find a negative correlation between people numerical ability and their likelihood to be delinquent and to default on mortgages. They also evidence that the magnitude of such effect is important, as those with the highest ability exhibit two-third less foreclosures relative to the lowest group.

If the financial literacy has been proved to be a cause for suboptimal investment and borrowing decisions, we have reason to believe that it may also drive inefficient mortgage refinancing choices. The literature has already showed that households do not behave rationally in the early termination or the refinancing of their mortgages. Green et al. (1999) find that mortgagors irrationally prepay their loans when it is not optimal and fail doing so when their option to prepay is in-the-money. Although they do not relate the prepayment decision to personal characteristics or to the

level of financial literacy, they show that a fraction (one-fourth) of those mortgagors act as in response of a declining collateral (house value) constraint. Similarly, Archer et al. (1996) analyze the role of post-origination income and collateral constraints effects upon the mortgage termination decision, showing that the groups of constrained mortgagors exhibit a markedly higher propensity to behave sub-optimally. Campbell (2006), using data from roughly 5.000 respondents to the American Housing Survey (AHS), shows that most active refinancers are younger, better educated, white households with more high-priced houses.

These studies share a common limitation, in that the presence of a cost (a penalty) to exercise the renegotiation or termination option dramatically reduces their economic convenience. Furthermore, the widely documented financial illiteracy poses serious doubts on the ability of most mortgagors to be fully aware of the right timing. Even in the event of a significant interest rate drop, households might not be paying the necessary attention to the current level of interest rates and realize the potential gain arising from a lower refinancing rate. In this paper we can rely on an exogenous shock that took place in the Italian mortgage market at the beginning of the year 2007: A new law (Bersani Law) was passed, and it imposed no early withdrawal penalty for domestic mortgages and the possibility for the mortgagors to transfer her loan to another financial institution at no cost. As a result, Italian mortgagors had the possibility to undertake one of these three actions: (a) moving the mortgage to another bank ("surroga") if better conditions were offered; (b) establish a new mortgage with a different bank (with lower borrowing rate) and prepay the existing loan; (c) threatening the lender to move the mortgage elsewhere in order to negotiate more favorable contractual conditions. All these three options guarantee the mortgagor to obtain a potential benefit at the expense of its counterpart. This law, combined with the dramatic interest reduction that took place between the 2008 and 2009, has created a potential disruptive effect on the market due to the extremely high number of (potential)

optimal renegotiations. Instead, despite the extensive media coverage that possibly drew the household's attention to the new financial opportunity, we document that only a minority of mortgagors (approximately 5% of existing contracts) proceeded with any of the three exercisable options, leaving on the table a monetary loss of almost 8 percent of the average loan value. This irrational behavior (i.e., the sluggishness in refinancing the existing loan) is highly attributable to proxies of financial illiteracy, after controlling for mortgage and financial market characteristics:¹ less educated, poorer, immigrated and women tend to exhibit higher sluggishness.

We aim at contributing to both the literature on financial illiteracy and mortgage refinancing providing the first robust analysis of households' behavior and their suboptimal choices in exercising the option to renegotiate. Different from the existing literature on this topic, our study can leverage on a number of peculiar characteristics that strengthen our conclusions.

First, our results are based on data taken from a primary Italian financial institution credit files. The sample used in the empirical analysis comprise around 170.000 FRMs (fixed rate mortgages) issued by the bank between January 2003 and June 2009 by a primary Italian financial institution. The dataset we use is obtained by treating a wider record file, after excluding observations for which no comprehensive information about the whole set of our variables of interest was available.² Through this dataset

¹ Unlike us, most studies make use of surveys to measure the magnitude of financial illiteracy. However, it has also been shown that the level of financial literacy is strongly correlated with socio-demographic characteristics of the households. For instance, Lusardi (2008) shows that, although financial illiteracy is widespread in the US population, it is specifically concentrated among certain groups such as low-educated, women and minorities. Jappelli and Padula (2013) support most of the those findings, as they document that more efficient saving decisions are carried out by male, young, married, graduated and high income investors.

² We exclude from our dataset ARMs (adjustable rate mortgages) as the economic convenience to renegotiate in this case is negligible.

we retrieve information on socio-demographic characteristics of the mortgagors from which we infer the level of financial literacy of households and relate it to the optimal decision to renegotiate. Second, unlike previous investigations, our insight are based on a natural experiment produced by an exogenous shock occurred in Italy in 2007 triggered by the introduction of a new law. This event has to be considered as unique for three main reasons: (1) the law has imposed no early withdraw penalty for all domestic mortgages, contributing to push in-the-money the option to renegotiate a FRM at any time in which the current funding rate falls below the contractual rate; (2) the tumultuous hype that followed the introduction of the law and made Italian households aware of the potential financial gains from mortgage renegotiation; (3) the concomitant 2008-2009 dramatic drop of interest rates (combined with the absence of an exercise price) made the option to renegotiate a FRM undisputedly valuable. Third, to the best of our knowledge, this is the first study documenting the suboptimal households' decision and the resulting loss due to lack of financial literacy in presence of substantial amount of wealth involved.

The paper is organized as follows. The next section provides an overview of the Italian market for mortgages and the Bersani Law. In section 3 we describe the research methodology. Section 4 presents our main findings and Section 5 concludes the study.

2. Legal Framework and the Refinancing Decision

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3. Data and Summary Statistics

Loan-level data on mortgages were provided to us by Unicredit Group, the largest Italian commercial bank. The proprietary mortgage dataset includes full information, as of 30 June 2009 (in what follows, the “examination date”), on domestic mortgages provided to households in Italy from 2003, for a total of more than 740,000 loans. Variables covered can be classified into three categories.

(a) Mortgage-specific information comprise the loan amount, its duration, the mortgage structure (essentially, adjustable-rate mortgage, ARMs, *vs.* fixed-rate mortgage, FRMs), the base rate (basically, the swap rate for FRMs and the 3-month Euribor for ARMs) and the additional credit spread, the loan-to-value (i.e., the ratio between the principal and the appraised value of the real property), the number of guarantors other than the borrower, details on the location of the property (at the level of zip code), details on the location of the bank branch originating the mortgage (at the level of zip code), and full information on special clauses attached to the loan (i.e., cap rates, some advantageous conditions to bank employees, etc.). (b) Borrower-level information include gender, occupation, monthly net income (for a subset of around 27,000 observations) and details on date, place of birth and nationality. (c) Finally, we have information on the status of the mortgage at the examination date. In particular, we are able to detect whether (and when) the mortgage has been prepaid or transferred to another bank. From comparing the type of mortgage and its conditions (i.e., base rate and credit spread) at the inception and at the examination date we are also able to detect whether the mortgage has been renegotiated (at different conditions) within the same bank.

Since, as we have anticipated, information on the net income of the borrowers is only available for a subset of observations, we decided to extend this variable to the complete dataset. To do this, we run a median regression of the reported net income on 18 occupation dummies (describing the profession of borrowers) for the subset of 27,000

observations for which both are available). We then predicted the net income for the complementary portion of our dataset for which the net income is not available (but profession dummies are).³ Also, we infer the level of education of the borrower (the graduate dummy) from her occupation.

We finally complement our dataset with market data (from Thomson Reuters Datastream) on swap and Euribor yield curves, and statistical data (from the Italian National Institute of Statistics, ISTAT) on population by geographical area.

For our analysis, we use only a particular subset of observations. Since the aim of our empirical analysis is to shed light on the behaviour of mortgagors in terms of taking advantage of the costless refinancing option offered by Bersani's law, we restrict our attention to plain vanilla FRMs, thus excluding ARMs (in all forms), other type of mortgages which can be considered as including optionalities (e.g, mortgages with interest rate caps or collars), and mortgages with favourable conditions to bank employees. We also exclude non-performing mortgages, and loans not originated within the bank. These loans have been already refinanced by the borrower, in that they were transferred to the bank from a different financial institution after 2007, in compliance of Bersani's law. For these mortgages, we lack information on the loan condition at the inception. Finally, we excluded mortgages showing data incompleteness in terms of basic mortgage characteristics. Data screens leave us with approximately 170,000 FRMs.

Figure 1 graphs the main characteristics of the mortgages included in our sample across the years of initiation. The rectangle provides the number of mortgages split between ARMs and FRMs. There is an increasing trend in the number of distributed mortgages ending in 2007 when the pattern

³ All coefficients from median regression are statistically significant at 1 percent level.

reverses, clearly as a result of the subprime crisis that hit the financial system at the end of the same year.⁴ The ratio between ARMs and FRMs strongly differs across the period considered. While the fraction of FRMs is minor from the 2003 to the 2005, starting from 2006 and more importantly from 2007 FRMs mortgages become prevalent, as a result of the twist on the yield curve occurred during the observed period. Figure 1 also shows the evolution of the average amount of the loan, that starts from approximately €65.000 to almost double at its peak (2007), to slightly decrease over the following years (most likely effect of the subprime crisis).

Figure 2 displays the time-evolution of interest rates. At the beginning of our period of investigation the spread long-to-short term was roughly two percent, suggesting significant steepness of the yield curve.⁵ Three years later the same spread is halved and towards the end of 2007 the yield curve becomes virtually flat, to steepen again towards the end of our observation period. If we compare the evolution of interest rates to the proportion of FRMs to ARMs (Figure 1), we can notice, as expected, a very strong correlation. As widely suggested in the literature, households are more inclined to opt for an ARM when short term interest rates are lower than long term rates. We confirm this empirical trend, as the higher fraction of ARMs is noticeable when the spread (20 years rate minus 3 month rate) is large and positive. Oppositely, when the yield curve flattens, households choose a larger fraction of FRMs. The inclusion of both 3-month and 20-year interest rates within the same figure does not allow us to fully appreciate the drop on the long term rates that occurred towards the end of the 2008. In fact, the use of the same scale, combined with the higher volatility of short term rates, makes us underrate the magnitude of the decrease of long term interest rates. However, if we

⁴ Year 2009 reports the number of mortgages at the end of the first semester. As a result, this number is not perfectly comparable to those of the previous years.

⁵ Figure 2 displays the 3 month and 20 year interbank rates to account for short and long term maturities, respectively. These maturities reflect the median maturities of the ARMs and FRMs belonging to our sample.

compare the 20 year rate registered around the first part of the period to the one observed towards the end of it, we can notice approximately 100 basis points drop.

Table 1 shows the basic mean characteristics of our sample of FRMs by year of inception. The average loan amounts to around 113,000 euros and its average duration is 22 year. Both these figures show an increasing trend over the considered time period. Not surprisingly, the credit spread is lower at the beginning of our time period, and the loan-to-value is higher, reflecting the deteriorating market conditions in the final part of 2008 and in 2009.⁶

Table 2 depicts the descriptive statistics of our sample, divided by the characteristics of mortgages, borrowers, geographical area and market conditions. According to this table, the mean (median) mortgage in the considered time period amounts to €110,000 (€100,000), lasts 21 (20) years, has a LTV equal to 61 (67) percent and, in median, shows no guarantors other than the borrower. Comparing these numbers with those of Jiang et al. (2013), who study a sample of US mortgages in approximately the same time period, we see that our typical mortgage is smaller – their mean (median) amount is about \$270,000 (\$230,000) – and is provided for a lower percentage of the appraised value of the property – their mean (median) LTV is 81 (80) percent. In terms of personal characteristics of borrowers, Table 2 shows that the average mortgagor is close to 40 years old and has a net monthly income slightly below €1,500. Two third of our borrowers are male, 12 percent of them has graduated and about 10 percent are non-Italian. Some figures on Italian population are offered by the third panel of Table 2. Noteworthy is to consider that more than half our mortgages have been issued in the North of Italy. Finally, the last panel gives information on market conditions. Swap rates

⁶ Please note that due to confidentiality reasons we were not allowed to disclose the absolute amount of credit spread applied to mortgages. Credit spread in Table 1 has been normalized with respect to the average 2003 figure. Therefore, it has to be interpreted relative to this base year.

have decreased, on average, in the considered time period. Interestingly, the percentage of active borrowers – who decided to take advantage of the better market condition exploiting the new favourable regulation on mortgage refinancing – is small, being it below 5 percent.

4. Results and Discussion

The combined effect of the introduction of Bersani law and the drop in the (long term) interest rates has produced a significant economic potential gain in refinancing the existing mortgages. The concept of refinancing has in this setting a threefold meaning. In essence, in order to capture the gain from the exercise of the refinancing option, Italian mortgagors had the possibility to undertake one of these three actions: (a) moving the mortgage to another bank ("surroga") if better economic conditions were met; (b) establish a new mortgage with a different bank (with lower borrowing rate) and prepay the existing loan; (c) threatening the current mortgagees to leave in order to gain more favorable contractual conditions. All these three options guarantee the mortgagor to obtain a potential benefit on the expense of its counterpart. The scope of this section is verifying what are the main determinants upon the households' decision to actively react to the emerged financial opportunity. In order to respond to this question, we first run a logit regression that accounts any of the three possible above-mentioned actions (Table 3), controlling for mortgages' contract specifications, exogenous events (interest rates) and socio-demographic characteristics. Since the possible rationales for undertaking one relative than other actions might differ, we also run separate logit regressions for surrogated (Table 4), prepaid (Table 5) and renegotiated (Table 6) mortgages.

5. Conclusions

In the 2007 a new law was passed in Italy that allowed mortgagors to extinguish their loans at no cost. This reform, along with the drop of interest rates occurred between the 2008 and 2009, has produced a unique opportunity to refinance the fixed rate mortgages with substantial gains. In spite of fundamental economic convenience, only a minority of borrowers exercised their right and we show that the evidenced sluggishness is strongly associated with proxies of financial illiteracy. In fact, after controlling for a number of mortgage characteristics, we show that younger, men, better educated, not immigrant are more likely to take advantage of the exercise gain of the refinancing option.

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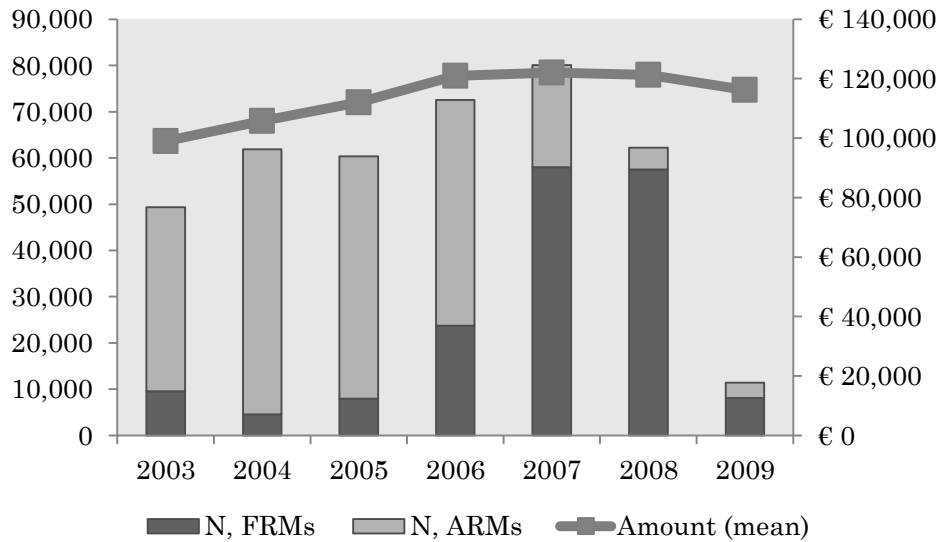


Figure 1 – *Distribution of mortgages by years.* The figure depicts the number of mortgage loans (rectangles, left axis), divided by FRMs v. ARMs, and their average amount (solid line, right axis, in €), as a function of the year of inception. (Year 2009 figures refer to the first semester only.)

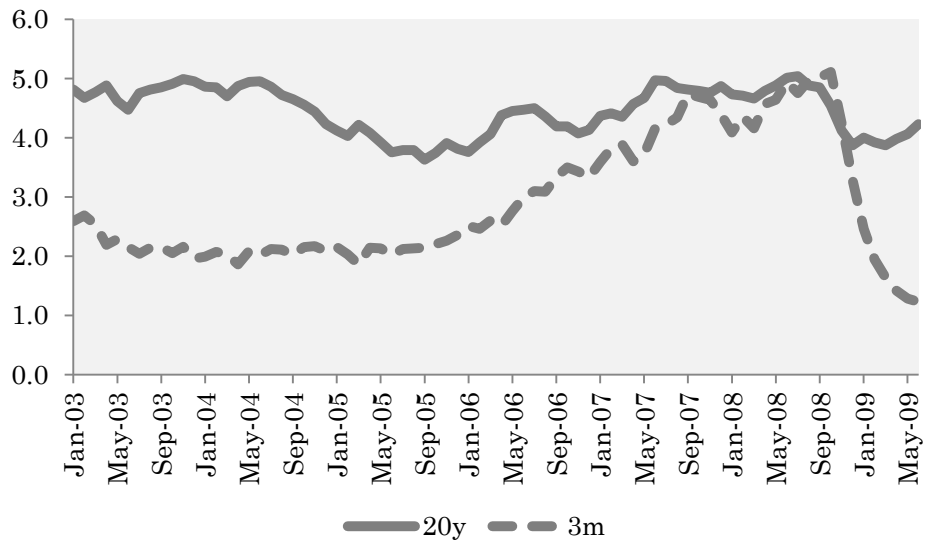


Figure 2 – Pattern of interest rates. The figure depicts the pattern of 20-year swap rate (solid line) and 3-month Euribor (dashed line), from January, 2003 to June, 2009. Numbers are expressed in percentage.

Year	Amount, €	Maturity, years	Spread (*)	LTV, %	No. Guarantors
2003	80,031.39	19.49	100.0	65.80	0.50
2004	83,365.84	19.84	109.7	66.48	0.28
2005	93,940.07	19.74	90.6	63.05	0.58
2006	102,651.90	19.93	86.1	57.55	1.02
2007	114,688.60	22.42	92.4	61.35	0.93
2008	118,102.60	23.15	108.3	61.55	0.61
2009	111,824.70	22.36	151.6	58.33	0.45
Total	113,181.10	22.26	86.5	60.82	0.78

Table 1 – Distribution of mortgages by year of inception. The table reports the distribution of mortgage loans by year of inception. *Amount* is the average principal of the loan (in euros), *Maturity* is the average length of the loan at inception (in years), *Spread* is the average spread over the IRS rate paid by the borrower, *LTV* is the average loan-to-value, i.e. the ratio between the principal of the loan and the estimated value of the real property, *No. Guarantors* is the average number of guarantors of the loan. (*) For confidentiality reasons, the spread over the base rate (*Spread*) has been normalized at 100 at the beginning of the time period (year 2003). Hence, *Spread* has to be interpreted as the percentage increase or decrease of the credit spread over time relative to year 2003 figure.

Year	N	Mean	SD	Min	Q1	Median	Q3	Max
Amount, €	169,307	110,002	78,968	1,422	68,705	100,000	135,000	7,000,000
Maturity, y	169,307	21.3	7.2	1.4	15.0	20.0	30.0	40.0
Spread (*)	126,599	86.6	28.1	5.4	66.0	77.6	100.9	305.1
LTV, %	147,259	60.7	20.4	11.9	45.3	66.9	78.4	100.0
No. Guarantors	169,307	0.8	1.1	0.0	0.0	0.0	1.0	5.0
Age	167,609	38.9	10.1	21	31	37	45	67
Income (pred.)	165,865	1,481.9	315.5	950	1,368	1,444	1,444	3,500
Man	167,603	0.67	0.47	.	.	.	.	.
Graduate	165,865	0.12	0.33	.	.	.	.	.
Foreign	163,021	0.09	0.29	.	.	.	.	.
Population	169,261	650,393	786,619	98	27,815	184,663	1,324,110	2,761,477
North	169,279	0.53	0.50	.	.	.	.	.
Center	169,279	0.15	0.36	.	.	.	.	.
South	169,279	0.31	0.46	.	.	.	.	.
IRS at Inception, %	169,307	4.50	0.41	2.71	4.23	4.65	4.82	5.10
Interest diff., %	169,307	-0.43	0.40	-2.06	-0.71	-0.56	-0.20	0.64
Instalment	126,599	783.0	441.1	38.7	544.7	701.8	911.8	22,938.0
Coverage ratio	124,421	0.53	0.29	0.02	0.37	0.48	0.63	16.38
Active	169,307	0.047	0.211	.	.	.	.	.
Prepay	169,307	0.029	0.169	.	.	.	.	.
Surrogate	169,307	0.013	0.113	.	.	.	.	.
Renegotiate	117,372	0.007	0.082	.	.	.	.	.

Table 2 – Descriptive statistics. The table reports descriptive statistics for the whole sample of 169,307 mortgage loans. *Amount* is the principal of the loan (in euros), *Maturity* is the length of the loan at inception (in years), *Spread* is the spread over the IRS rate paid by the borrower, (*) for confidentiality reasons, all numbers have been rescaled by the average spread in year 2003 and multiplied by 100, *LTV* is the loan-to-value, i.e. the ratio between the principal of the loan and the estimated value of the real property (in percentage), *No. Guarantors* is the number of guarantors of the loan, *Age* is the age of the borrower at the inception of the mortgage, *Income (pred.)* is the predicted monthly income of the borrower from median regression of income on borrower’s occupation (please refer to the body of the paper for details), *Man* is a dummy variable taking 1 if the borrower’s gender is male, *Graduate* is a dummy variable taking 1 if the borrower has graduated from a university, *Foreign* is a dummy variable taking 1 if the borrower’s nationality is other than Italian, *Population* is the resident population in the urban area where the bank is located (by zip code), *North* (resp. *Center* and *South*) is a dummy variable taking 1 if the bank branch is located in a region of the North (resp. Center and South) of Italy, *IRS at Inception* is the fixed base rate of the loan mortgage, *Interest diff.* is the difference between the (average monthly) IRS rate at the end of June, 2009 and the IRS rate at the inception of the mortgage, *Instalment* is the monthly fixed instalment paid on the mortgage, *Coverage ratio* is the ratio of the monthly instalment over the borrower monthly income, *Active* is a dummy taking 1 if the mortgage has been either refinanced, surrogated or prepaid, *Refinance*, *Surrogate*, and *Prepay* are dummies taking 1 if the mortgage has been refinanced, surrogated or prepaid, respectively.

<i>Dependent variable: Active</i>	(1) Model	(2) Model	(3) Model
<i>Interest Diff.</i>	-0.73*** (0.052)	-0.73*** (0.053)	-0.71*** (0.052)
<i>Ln(Amount)</i>	0.54*** (0.031)	0.57*** (0.033)	0.55*** (0.034)
<i>Maturity</i>	0.02*** (0.002)	0.01*** (0.003)	0.01*** (0.003)
<i>LTV</i>	-0.51*** (0.080)	-0.54*** (0.083)	-0.52*** (0.087)
<i>No. Guarantors</i>	-0.55*** (0.019)	-0.57*** (0.020)	-0.55*** (0.020)
<i>Man</i>		0.14*** (0.030)	0.12*** (0.030)
<i>Ln(Income)</i>		-0.27*** (0.104)	-0.20 (0.103)
<i>Age</i>		-0.06*** (0.008)	-0.06*** (0.008)
<i>Age Squared</i>		0.00*** (0.000)	0.00*** (0.000)
<i>Foreign</i>		-0.29*** (0.051)	-0.34*** (0.051)
<i>Graduate</i>		0.26*** (0.046)	0.23*** (0.051)
<i>North</i>			0.52*** (0.039)
<i>Center</i>			0.44*** (0.050)
<i>Ln(Population)</i>			-0.01 (0.010)
<i>Year Fixed Effects</i>	Yes	Yes	Yes
<i>Constant</i>	-7.60*** (0.332)	-4.61*** (0.782)	-5.39*** (0.780)
Observations	147,045	143,780	143,736
McFadden's R squared	0.082	0.085	0.090

Table 3 – Likelihood of active borrower. The table reports the results of a logit regression of *Active*, i.e. a dummy taking 1 if the mortgage has been either refinanced, surrogated or prepaid by the borrower, on the chosen explanatory variables. *Interest diff.* is the difference between the (average monthly) IRS rate at the end of June 2009 and the IRS rate at the inception of the mortgage, *Ln(Amount)* is the natural logarithm of the principal of the loan, *Maturity* is the length of the loan at inception, *LTV* is the loan-to-value, i.e. the ratio between the principal of the loan and the estimated value of the real property, *No. Guarantors* is the number of guarantors of the loan, *Man* is a dummy variable taking 1 if the borrower's gender is male, *Ln(Income)* is the natural logarithm of the predicted monthly income of the borrower from median regression of income on borrower's occupation, *Age* (*Age squared*) is the age (squared age) of the borrower at the inception of the mortgage, *Foreign* is a dummy variable taking 1 if the borrower's nationality is other than Italian, *Graduate* is a dummy variable taking 1 if the borrower has graduated from a university, *North* (resp. *Center*) is a dummy variable taking 1 if the bank branch is located in a region of the North (resp. Center) of Italy, *Ln(Population)* is the natural logarithm of the resident population in the urban area where the bank is located (by zip code). Robust standard errors are given in parentheses. ***, **, * indicate statistical significance at 1, 5 and 10 percent level, respectively.

<i>Dependent variable: Surrogate</i>	(1) Model	(2) Model	(3) Model
Interest Diff.	-1.262*** (0.091)	-1.297*** (0.093)	-1.302*** (0.094)
Ln(Amount)	1.097*** (0.043)	1.179*** (0.049)	1.242*** (0.050)
Duration	0.041*** (0.004)	0.030*** (0.005)	0.034*** (0.004)
LTV	-0.642*** (0.143)	-0.704*** (0.151)	-0.778*** (0.156)
No. Guarantors	-0.507*** (0.032)	-0.528*** (0.033)	-0.581*** (0.035)
Man		0.204*** (0.052)	0.217*** (0.052)
Ln(Income)		-0.167 (0.172)	-0.236 (0.172)
Age		-0.017 (0.017)	-0.024 (0.017)
Age Squared		-0.000 (0.000)	-0.000 (0.000)
Foreign		-0.527*** (0.087)	-0.511*** (0.088)
Graduate		0.308*** (0.080)	0.358*** (0.080)
North			0.330*** (0.062)
Center			0.156* (0.082)
Ln(Population)			-0.124*** (0.011)
Year Fixed Effects	Yes	Yes	Yes
Constant	-17.159*** (0.479)	-15.953*** (1.264)	-14.780*** (1.272)
Observations	142,831	139,641	139,604
McFadden's R squared	0.075	0.084	0.089

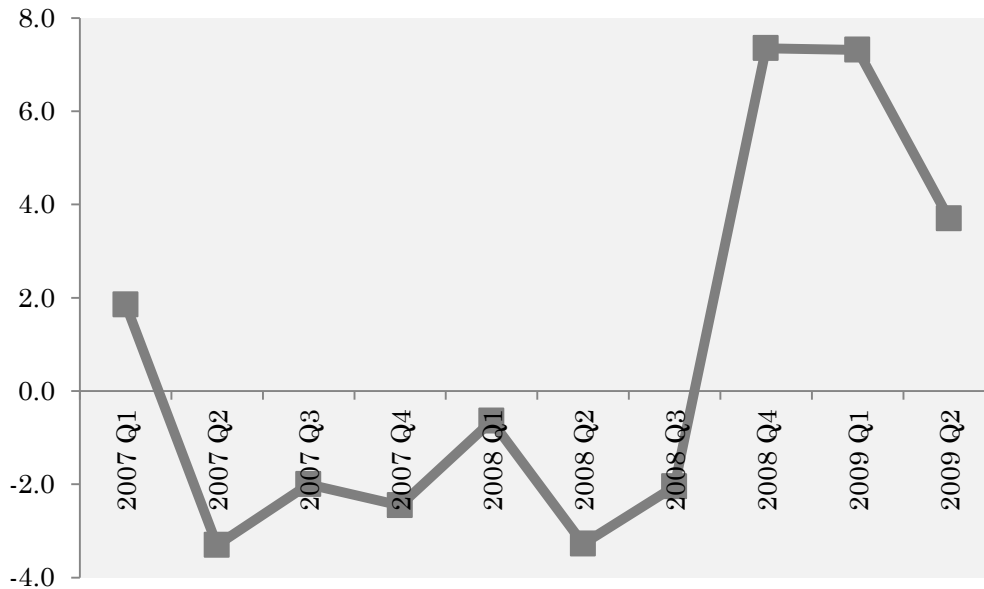
Table 4 – Likelihood to surrogate. The table reports the results of a logit regression of *Surrogate*, i.e. a dummy taking 1 if the mortgage has been surrogated by the borrower, on the chosen explanatory variables. *Interest diff.* is the difference between the (average monthly) IRS rate at the end of June 2009 and the IRS rate at the inception of the mortgage, *Ln(Amount)* is the natural logarithm of the principal of the loan, *Maturity* is the length of the loan at inception, *LTV* is the loan-to-value, i.e. the ratio between the principal of the loan and the estimated value of the real property, *No. Guarantors* is the number of guarantors of the loan, *Man* is a dummy variable taking 1 if the borrower's gender is male, *Ln(Income)* is the natural logarithm of the predicted monthly income of the borrower from median regression of income on borrower's occupation, *Age* (*Age squared*) is the age (squared age) of the borrower at the inception of the mortgage, *Foreign* is a dummy variable taking 1 if the borrower's nationality is other than Italian, *Graduate* is a dummy variable taking 1 if the borrower has graduated from a university, *North* (resp. *Center*) is a dummy variable taking 1 if the bank branch is located in a region of the North (resp. Center) of Italy, *Ln(Population)* is the natural logarithm of the resident population in the urban area where the bank is located (by zip code). Robust standard errors are given in parentheses. ***, **, * indicate statistical significance at 1, 5 and 10 percent level, respectively.

<i>Dependent variable: Prepay</i>	(1) Model	(2) Model	(3) Model
Interest Diff.	-0.714*** (0.071)	-0.675*** (0.071)	-0.642*** (0.070)
Ln(Amount)	0.205*** (0.044)	0.219*** (0.046)	0.157*** (0.046)
Duration	0.005 (0.003)	0.005 (0.003)	-0.002 (0.003)
LTV	-0.607*** (0.106)	-0.622*** (0.110)	-0.484*** (0.112)
No. Guarantors	-0.636*** (0.028)	-0.654*** (0.028)	-0.628*** (0.029)
Man		0.127*** (0.039)	0.097** (0.039)
Ln(Income)		-0.353** (0.144)	-0.248* (0.141)
Age		-0.080*** (0.009)	-0.080*** (0.009)
Age Squared		0.001*** (0.000)	0.001*** (0.000)
Foreign		-0.250*** (0.071)	-0.305*** (0.071)
Graduate		0.305*** (0.059)	0.240*** (0.061)
North			0.543*** (0.053)
Center			0.713*** (0.066)
Ln(Population)			0.046*** (0.010)
Time Fixed Effects	Yes	Yes	Yes
Constant	-3.697*** (0.459)	0.304 (1.089)	-0.783 (1.074)
Observations	144,253	141,047	141,006
McFadden's R squared	0.098	0.100	0.107

Table 5 – Likelihood to prepay. The table reports the results of a logit regression of *Prepay*, i.e. a dummy taking 1 if the mortgage has been prepaid by the borrower, on the chosen explanatory variables. *Interest diff.* is the difference between the (average monthly) IRS rate at the end of June 2009 and the IRS rate at the inception of the mortgage, *Ln(Amount)* is the natural logarithm of the principal of the loan, *Maturity* is the length of the loan at inception, *LTV* is the loan-to-value, i.e. the ratio between the principal of the loan and the estimated value of the real property, *No. Guarantors* is the number of guarantors of the loan, *Man* is a dummy variable taking 1 if the borrower's gender is male, *Ln(Income)* is the natural logarithm of the predicted monthly income of the borrower from median regression of income on borrower's occupation, *Age (Age squared)* is the age (squared age) of the borrower at the inception of the mortgage, *Foreign* is a dummy variable taking 1 if the borrower's nationality is other than Italian, *Graduate* is a dummy variable taking 1 if the borrower has graduated from a university, *North* (resp. *Center*) is a dummy variable taking 1 if the bank branch is located in a region of the North (resp. Center) of Italy, *Ln(Population)* is the natural logarithm of the resident population in the urban area where the bank is located (by zip code). Robust standard errors are given in parentheses. ***, **, * indicate statistical significance at 1, 5 and 10 percent level, respectively.

<i>Dependent variable: Renegotiate</i>	(1) Model	(2) Model	(3) Model
Interest Diff.	0.709*** (0.165)	0.678*** (0.167)	0.699*** (0.164)
Ln(Amount)	0.705*** (0.082)	0.760*** (0.090)	0.759*** (0.091)
Duration	0.028*** (0.006)	0.025*** (0.007)	0.015** (0.007)
LTV	0.013** (0.006)	0.011* (0.006)	0.011* (0.006)
No. Guarantors	-0.353*** (0.045)	-0.357*** (0.046)	-0.221*** (0.045)
Man		-0.038 (0.082)	-0.054 (0.082)
Ln(Income)		0.112 (0.258)	0.283 (0.254)
Age		-0.003 (0.025)	0.010 (0.026)
Age Squared		0.000 (0.000)	-0.000 (0.000)
Foreign		0.143 (0.121)	0.042 (0.122)
Graduate		-0.374*** (0.144)	-0.380*** (0.147)
North			0.296** (0.127)
Center			-0.682*** (0.195)
Ln(Population)			0.234*** (0.029)
Time Fixed Effects	Yes	Yes	Yes
Constant	-10.978*** (0.890)	-12.280*** (1.952)	-16.994*** (1.996)
Observations	115,644	113,268	113,239
McFadden's R squared	0.178	0.181	0.196

Table 6 – Likelihood to renegotiate. The table reports the results of a logit regression of *Renegotiate*, i.e. a dummy taking 1 if the mortgage has been renegotiated by the borrower, on the chosen explanatory variables. *Interest diff.* is the difference between the (average monthly) IRS rate at the end of June 2009 and the IRS rate at the inception of the mortgage, *Ln(Amount)* is the natural logarithm of the principal of the loan, *Maturity* is the length of the loan at inception, *LTV* is the loan-to-value, i.e. the ratio between the principal of the loan and the estimated value of the real property, *No. Guarantors* is the number of guarantors of the loan, *Man* is a dummy variable taking 1 if the borrower's gender is male, *Ln(Income)* is the natural logarithm of the predicted monthly income of the borrower from median regression of income on borrower's occupation, *Age* (*Age squared*) is the age (squared age) of the borrower at the inception of the mortgage, *Foreign* is a dummy variable taking 1 if the borrower's nationality is other than Italian, *Graduate* is a dummy variable taking 1 if the borrower has graduated from a university, *North* (resp. *Center*) is a dummy variable taking 1 if the bank branch is located in a region of the North (resp. Center) of Italy, *Ln(Population)* is the natural logarithm of the resident population in the urban area where the bank is located (by zip code). Robust standard errors are given in parentheses. ***, **, * indicate statistical significance at 1, 5 and 10 percent level, respectively.



	Mean	Median	SD	Min	Max
2007 Q1	2,143	1,868	5,131	-90,310	117,609
2007 Q2	-3,710	-2,019	5,206	-161,471	4,988
2007 Q3	-2,251	-611	4,800	-132,244	21,515
2007 Q4	-2,761	-1,122	4,878	-138,326	14,777
2008 Q1	-754	170	4,543	-115,845	40,185
2008 Q2	-3,533	-1,919	4,922	-147,396	3,350
2008 Q3	-2,188	-651	4,571	-124,569	21,160
2008 Q4	8,586	5,745	9,111	-7,283	221,896
2009 Q1	8,327	5,876	8,365	-7,580	218,740
2009 Q2	4,161	3,109	5,584	-56,637	133,129

Figure 3 – Average loss to sluggish borrowers. The chart depicts the potential average loss suffered by sluggish borrowers, i.e. borrowers who do not actively manage their mortgage. The loss has been computed as the present value of the difference between the fixed-amount instalments paid by the borrowers according to their initial funding rate and the potential instalments computed at the average IRS rate prevailing at each quarter from 2007 Q1 and 2008 Q2 (plus the original credit spread), rescaled by the remaining principal of the mortgage at the same date. Consequently, the vertical axis should be regarded as an average potential loss as a percentage of the monetary amount of the loan. The table gives some descriptive statistics of the monetary potential loss (i.e., the potential loss not rescaled by the remaining principal of the mortgage).