

## **PRICE SETTING ANOMALIES AND BANK PROFITABILITY CONCERNS IN THE ITALIAN RESIDENTIAL MORTGAGE MARKET**

After the onset of the current financial crisis the discrepancy between interest rates applied to new residential mortgages and their indexation rates has widened dramatically. Moreover, since the third quarter of 2011, their usual relationship has broken down.

The present analysis assesses the factors that have influenced new mortgages interest rates using a analytical framework originally adopted by Button (2010) and sets out the implications for bank profitability.

Outcomes clearly show that the main cause of the anomalous trend of new mortgage rates compared with that for their reference rates was the increase in bank funding cost, that forced Italian lenders to modify the transfer rate usually applied in setting the price of new mortgages. As a consequence, the starting point for the interest rate setting of new mortgages no longer coincides with their reference rate.

Italian banks' margin on both new lending and stock of residential mortgages were considerably affected by disruptions in wholesale markets. Profitability of a bank's portfolio of adjustable rate mortgages was negatively affected compared to that for the portfolio of fixed rate mortgages. Since two thirds of the outstanding volume of mortgages were adjustable rate contracts, the profitability of the whole portfolio of residential mortgage faced a 1.5% reduction over the period 2009-2012.

banking ; mortgages ; interest rate margin; lending interest rates setting

## **1. Introduction**

Under normal market conditions, interest rates charged on new lending for residential mortgages follow the trend of their indexation rate. In Italy, however, after the onset of the financial crisis, the relationship between new mortgages interest rates and their indexation rates<sup>1</sup> has broken down.

The aim of this work is to examine the determinants of this anomalous trend of mortgages' interest rates compared with that of their reference rates. Moreover, since the Italian mortgage market is characterized by the dominance of the adjustable rate mortgage, the paper also examines the possibility that this preference should be somewhat influenced by lender pricing policies.

The empirical analysis is divided into two parts. The first part explores the factors that may have influenced the trend of new mortgages interest rates after the onset of the financial crisis; to achieve this, interest rates on new adjustable rate mortgages (ARMs) and fixed rate mortgages (FRMs) will be decomposed into bank funding cost, credit risk charges and a residual component, by adopting the analytical framework originally applied by Button (2010). The second part sets out the implications on bank profitability from disruption in the residential mortgage market by estimating Italian banks' margin on new mortgages and stock, starting from the onset of the financial crisis.

This paper contains some valuable points which should be taken into consideration by policy makers in addressing public policy initiatives. For example, if mortgage interest rates have increased due to an increased credit risk faced by banks, then public policy attention

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<sup>1</sup> The typical indexation rate for ARMs is the 3-month Euribor and that for FRMs is a long-term Eurirs (having the same maturity of the mortgage).

might be focused on the improvement of the credit risk requirement criteria and on the attenuation of their pro-cycle effects. Or, if the increase in mortgage interest rates is mainly related to an increase of funding cost, then public policy attention should be focused on the strengthening of a climate of financial stability. Finally, if market power is found to be the factor that best explains the increase in new mortgage interest rates, public policy attention logically ought to concern itself with encouraging more competition among banks.

The paper's structure is as follows: section 2 discusses relevant literature on the determinants of lending interest rates; section 3 develops the empirical specification of the decomposition framework of new mortgage interest rate and presents the empirical results, section 4 analyzes the consequences for banks owing to disruptions in the residential mortgage market, while section 5 summarises all of the main conclusions.

## **2. Main concepts and relevant literature**

After the onset of the financial crisis the discrepancy between interest rates on new residential mortgages and their indexation rates has widened dramatically, moreover, since the third quarter of 2011, their normal relationship has broken down (Figure 1, for ARMs, and Figure 2, for FRMs).

Recent empirical contributions show that, as a consequence of the financial crisis, unusual behaviours of new mortgage interest rates had also occurred in other domestic market (Button (2010), Krainer (2010)). Outcomes from these analyses clearly underline that the main causes of such anomalous trends were liquidity shocks that affected bank funding.

The importance of bank funding cost in setting new mortgage interest rates also comes out from many other contributions not focussed on the financial crisis period (Hannan and Berger (1991), De Bondt (2002), De Graeve (2007), Vickery (2007), Rakanerud et al. (2011)).

In particular, comparing the US and the UK mortgage markets, the analysis carried out by Vickery (2007) finds that US bank spreads on FRMs are considerably lower than those for the UK due to differences in bank funding between the countries<sup>2</sup>.

Various contributions also analyze the influence on new lending price setting from other factors, such as the degree of competition (Mandelman (2006), Generali et al. (2010), Rakanerud et al. (2011)) and borrowers' credit risk (Kwark (2002), Amato and Remolona (2003) Cremers et al. (2005), Pederzoli and Torricelli (2005), Magri and Pico (2010), Vacca (2011)).

Using data from 124 countries for the years 1990-2000, Mandelman (2006) documents that cyclical fluctuations in bank spreads are related to changes in market power and competitive pressure within the sector. If banks have market power, Rakanerud et al. (2011) find evidence of incomplete pass-through from market interest rates to retail rates. While, Generali et al. (2010) highlight that the importance of preserving customer relationships could lead banks to smooth rates in order to shield borrowers from market rate fluctuations.

The impact of any variation in households financial situation on bank spreads is not clear cut. According to a forecasting approach, the economic cycle would follow a partly predictable pattern and the credit risk measure within interest rates would therefore grow before recessions, while, according to a random walk view the irregular component of the

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<sup>2</sup> More specifically US secondary market liquidity was traditionally favoured by Fannie Mae and Freddie Mac plans of purchase of mortgage back securities.

cycle is predominant, making prediction difficult, and therefore the credit risk charge within interest rates would basically reflect current economic conditions (Kwark, 2002, Pederzoli and Torricelli, 2005) 1991).

The works by Amato and Remolona (2003) and Cremers et al (2005) suggest that bank spread charged to risky customers might be higher with respect to historical default rates because it incorporates an insurance premium against jump-to-default risk. Therefore, in a period of economic expansion, banks were seen to apply higher spread (including insurance premium) while in economic downturns bank spreads appeared lower than those observed during expansion periods.

With reference to the Italian mortgage market, during the period 2003-2007, the increase in households indebtedness and the rise in the interest payment burden occurred in parallel with the decline in bank spreads for ARMs and the increase in those for FRMs (Figure 3)<sup>3</sup>. In addition, the increase in bank spreads that occurred in mid-2011 was not associated with a generalized deterioration of households' credit risk. In contrast, lending policies by Italian banks were more restrictive (Felici et al. (2012) and Magri and Pico (2012)). As a consequence of the above change in lending policies, Felici et al (2012) also find that mortgages originated in 2009 and 2010 show the lowest frequency of non-performing loans, while those originated in 2006, 2007 and 2008 show the highest. Therefore, the smaller spreads applied by Italian banks in the pre-crisis period may symbolize the surprise effect triggered by a crisis whose progress has been largely unforeseen, both in intensity and speed

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<sup>3</sup> Cf. Rossi (2008). Infante and Rossi (2009), on the basis of data from the supervisory activity by the Bank of Italy, also find that the period 1997-2006 was associated with a loosening of credit standards and a decrease in bank spreads.

C.f. Magri and Pico (2010), Vacca (2011), while the higher spreads applied in the following periods may represent a compensation of previous estimation errors (Button (2010)).

Expectations of stricter regulation requirements on capital adequacy may also have affected interest rates on new lending. To this end, Button (2010) finding that, since the onset of the financial crisis, British banks seem to have anticipated the expected greater cost of capital over the life of the loans stemming from Basel III regulation, by increasing the relative capital charge in setting new lending interest rates.

Finally, institutional factors may also influence the level of bank spread. For instance, a number of research contributions investigate the relationship between the quality of legal enforcement of loan contracts and the allocation of credit to households. To this end, Fabbri and Padula (2004), Casolaro et al. (2005), Jappelli et al. (2005) and De Gasperis (2008) find that the performance of the judicial districts affects both the probability of being credit-constrained and the amount of lending offered. In contrast, no clearcut effects are found regarding levels of interest rates.

### **3. Exploring the determinants of the increase in mortgage interest rates**

#### **3.1. Data and methodology**

The empirical analysis decomposes new mortgage interest rates into three components: lenders' funding cost, credit risk charges and a residual. Data on interest rates, lending volumes, arrears and bank funding cost are taken from the statistical database of the Bank of Italy, in which they have been published on a periodical basis from different starting points. Thus, a calibration of the time period of the analysis was required. The analysis covers the period 2004-2012 which should allow us to capture the influences on interest rates setting for

new residential mortgages under different market conditions. More specifically, three periods were isolated: the period from January 2004 up to the end of 2007, which was characterized by a buoyant residential mortgage market; the period comprised between 2008 and 2010, which was characterized by the international financial crisis and the period starting from 2011, in which the effects of the second stage of the crisis, related to sovereign debts, influenced the market.

The decomposition framework of new mortgage interest rates is based on the contribution by Button (2010), which is related to the UK households loan market. Therefore, some relevant adjustments have been required in order to take into account country specific issues. Moreover, since the Italian mortgage market is characterized by the dominance of the ARM<sup>4</sup>, the possibility that this preference should be somewhat influenced by lender pricing policies will also be explored. As a result, the decomposition exercise is performed twice: for the interest rates of new FRMs as well as for new ARMs.

In addition, differently from Button (2010), an analysis of the determinants of the residual component will be carried out by exploring the influence of two factors: the degree of competition in the households loan market segment and the presence of a legal limitation on interest rates ceiling.

Section 3.2 and 3.3 describe the analytical framework respectively for the bank funding cost and the credit risk components. Section 3.4 discusses the main results.

### **3.2. Bank funding cost**

Banks typically set new lending interest rates at a spread above their marginal funding cost (MFC).

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<sup>4</sup> Cf. Bonaccorsi di Patti and Felici (2008); ECB (2009), Felici et al (2012); Magri and Pico (2012).

The MFC typically used by Italian banks as a starting point to price new ARMs is a short-term interest rate, the 3-month Euro Interbank Offered Rate (Euribor), while that for the new FRMs is the Euro Interest Rate Swap (Eurirs)<sup>5</sup>, with a maturity coinciding with that of the mortgage.

Since the onset of the financial crisis, the scenario that has traditionally characterized the funding strategies of Italian banks has considerably changed. Funding by interbank money markets has become more and more difficult, due to banks' deteriorating confidence in their counterparts. The opportunity to use securitized instruments as collateral in Eurosystem refinancing operations has favoured the issue of asset-backed securities<sup>6</sup>, while regulators encouraged banks to match mortgages maturity more closely with long-term funding. As a result, as the financial crisis deepened, long term debt has become the most efficient channel to raise a large amount of funding over a short period of time<sup>7</sup>.

The cost of funding was also greatly affected by the financial crisis. As depicted in **Figure 4**, prior to the financial crisis Italian banks were able to raise additional funds in the wholesale market with little difference between long-term and short-term funding cost. Since December 2008, the differential between long-term and short-term wholesale funding costs faced by Italian banks widened, and it increased even more during 2011. Furthermore, starting from 2011, the cost of long-term debt became more strictly related to the cost of long-term treasury bonds than in the past<sup>8</sup>.

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<sup>5</sup> Italian banks usually managed interest rate risk through interest rate swap contracts, by the substitution of the fixed-rate cash flows paid by borrowers with variable-rate cash flows.

<sup>6</sup> i.e. securities issued by special purpose vehicles and covered bonds. Cf. Bank of Italy (2012) p. 137.

<sup>7</sup> This evidence is especially true for larger banks, that were traditionally more dependent on the interbank money markets. Cf. Bank of Italy (2012).

<sup>8</sup> See also Cardillo and Zagnini (2012).

On the basis of the above considerations, it is likely that the increase in the gap between new mortgage interest rates and their indexation rates, that occurred since the end of 2011 (Figure 1 and 2), was determined by the boost in funding costs faced by Italian banks. More specifically, it is assumed that Italian banks were forced to change the MFC traditionally used for the price setting of new mortgages and to factor in the cost of long-term funding. To this end, the marginal cost of long-term debt for the price setting of new ARMs is estimated as the 3-month Euribor plus the premia of the banks' fixed-rate bond yield over the 10-year Eurirs<sup>9</sup>. The MFC of long term debt for the price setting of new FRMs is estimated as the sum of 10-year Eurirs and the premia of the bank fixed-rate bond yield over the 10-year Eurirs. Since Italian banks do not issue new long-term debt on a regular basis, a 12-month average of the fixed-rate bond yield is computed. Data on bank bond yield has been made publicly available from the statistical database of the Bank of Italy starting from March 2004.

### **3.3. Credit risk charges**

Credit risk includes two components: the expected loss (EL) and the unexpected loss or capital charge (UL). The first component takes into account the cost related to the most likely loss associated with the lending activity. The second component is related to the cost of holding capital to meet the possibility that losses might exceed estimation on EL.

In line with the well known specification, the EL is computed as the combination of three factors: the probability of default of the borrowers (PD), the loss given default (LGD), and the exposure at default (EAD).

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<sup>9</sup> Button (2010) uses banks' five-year credit default swap (CDS) premia. However, since CDS are quoted for only six Italian banks this variable does not appear adequate for the purpose of the present analysis.

$$EL_t = PD_t * LGD_t * EAD_t \quad (1)$$

For the EAD the analysis adopts the full loan amount, since householders may default at any time during the mortgage duration and banks should include the whole exposure.

Since estimations on PD and LGD are computed by lenders and are not publicly available, the author has estimated their charges on the basis of data openly accessible from the statistical database of the Bank of Italy and on reasonable assumptions.

In accordance with the methodology adopted by Button (2010), PD is estimated calibrating data on arrears rates (arrears as a proportion of the outstanding loans for residential mortgages)<sup>10</sup> with a default rate. Button (2010) applies a constant 0.7 default rate, for 75% loan-to-value (LTV) mortgages, provided by the Financial Services Authority (2009) for the year 2008.

With reference to the Italian mortgage market, the average LTV is significantly lower than 75% throughout all the period under analysis<sup>11</sup>. Considering that mortgages with higher collateralisation generally show a lower probability of default<sup>12</sup>, the default rate for the Italian residential mortgages is expected to be lower than that for the UK.

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<sup>10</sup> In line with Basel II criteria, the present analysis applies an extensive definition of arrears, which comprises both bad debts (total loans outstanding to households who have been declared insolvent) and impaired loans (the amount of loans to households other than those classified as bad debts that have been overdue and overdrawn for more than 90 days.). Since the Bank of Italy database does not publish information on arrears and impaired loans specifically related to the residential mortgage contracts, these are approximated with data on arrears for guaranteed loans. To this end, it is likely that estimations on EL will result higher than those obtained by banks using a more detailed dataset related to their lending portfolio.

<sup>11</sup> For the period 2003-2012 the average LTV for new residential mortgages varied from a minimum of 60.6% to a maximum of 73% (Bank of Italy (Statistical Bulletin - various years)), before 2003 it was even lower, around 55% (Casolaro et al. (2005)).

<sup>12</sup> While LTV is not a measure of affordability, a lower LTV means that a borrower has larger financial resources for home purchase and, probably, also a higher income. Moreover a lower LTV should increase the

Default rates have been computed by the author, as a 5-year average of new default<sup>13</sup>, seen as a proportion of the outstanding loans for residential mortgages, on the basis of data provided by the statistical data base of the Bank of Italy<sup>14</sup>.

$$PD = \text{arrears rate}_t * \text{default rate} \quad (2)$$

For estimating LGD, data on LTV and recovery rates are required, since lenders will incur a loss only if the sums recovered are lower than the value of the backing collateral.

Data on LTV have been published on a quarterly basis by the Bank of Italy since the third quarter of 2008<sup>15</sup>. For the previous periods, the present analysis adopts the assumption of a yearly 1% growth since a peak of 70% in 2006, and a subsequent yearly 1% decrease. This hypothesis seems to tally with the information on LTV provided by Magri and Pico (2012) for the above period of missing data.

Only significantly out-of-date information on recorded recovery rates from defaulted loans is available from a survey conducted by the Bank of Italy in 1999<sup>16</sup>. This document gives a glimpse of the great ineffectiveness of the system governing Italian rules and procedures for creditor protection. The average duration of legal enforcement is roughly 6.3 years and the average effective recovery rate for all mortgage contracts is around 57%, while no specific information is provided on residential mortgages. Unfortunately, it is likely that the

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willingness of a borrower to continue to meet mortgage payments. Button (2010) p. 177, Financial Services Authority (2009) p. 40.

<sup>13</sup> For retail exposures the requirement banks must use at least five years of data to estimate loss characteristics. C.f. Basel Committee on Banking Supervision (2006) p.62.

<sup>14</sup> Throughout the period under analysis, the value of this coefficient varies from 0.29% to 0.49%, thus, as expected, it is constantly lower than the coefficient applied by Button (2010).

<sup>15</sup> Bank of Italy, Sample survey on the housing market in Italy, various years.

<sup>16</sup> Bank of Italy (2001).

characteristics of the Italian credit recovery system did not change a lot after 1999<sup>17</sup>. To this end, the present analysis applies a conservative estimate of 60% as a constant recovery rate.

$$\text{LGD} = \max (0; 1 - (1/\text{LTV}) * 0.60) \quad (3)$$

The capital charge (CC) has been calculated taking into account the regulatory requirements from Basel I and II regulations:

$$\text{CC} = \text{Capital Requirement (CR)} * \text{Risk Weight (RW)} * \text{Cost of capital (R}_c) \quad (4)$$

According to Button (2010), the capital charge is set on a regulatory capital basis, but, instead of considering the 8% minimum capital requirement from the Basel I and II regulations, this analysis applies the average total capital ratios from the Italian banking system<sup>18</sup>, with the aim of capturing the capital-strengthening efforts made by Italian banks, following the onset of the financial crisis<sup>19</sup>.

For the risk weights component, the coefficients from the standardised approach in Basel I and II regulations are applied<sup>20</sup>.

In contrast with Button (2010), who places the cost of capital at a constant 10%, this analysis applies estimations on a monthly basis derived from the cost of capital as published by the Bank of Italy (2012), for the period January 2007-February 2012. Bank of Italy

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<sup>17</sup> Cf. Cannata et al. (2012), p.13.

<sup>18</sup> Bank of Italy, Economic Bulletin, various years.

<sup>19</sup> Italian banks significantly strengthened their highest-quality capital resources, those best able to absorb losses, thanks to massive capital increases and, to a lesser extent, self-financing. Bank of Italy (2012). P.144.

<sup>20</sup> For residential mortgages the RW is 50% up to 2006 and 35% since 2007. Cf. Basel Committee on Banking Supervision (2006).

estimations show a cost of capital which remained stable above the 10% level, since the third quarter of 2009, and more than 15%, during the second half of 2011. The cost of capital for the periods in which these estimations are not available, January 2004-December 2006 and March-December 2012, are estimated by the author using the CAPM method<sup>21</sup>.

### 3.4. Results

The present section discusses the results of the decomposition exercise. Considering the assumptions adopted in building this analytical framework, it is more useful to view the relative sizes of each component and their trends over time, instead of focusing on their absolute size at any particular point in time.

Figure 5 and 6 show the results for interest rates on new ARMs. The two figures differ for the MFC used starting from the fourth quarter of 2011, that is the 3-month Euribor in Figure 5 and a long-term MFC in Figure 6; while both of the figures use the 3-month Euribor for the previous period. Comparing Figure 5 and 6, it can be seen that the long-term MCF explains quite well the increase in the interest rate on new ARMs that occurred since the fourth quarter of 2011. Therefore, the hypothesis of the change in the MFC, discussed in section 3.1, appears realistic.

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<sup>21</sup>  $E(R_c) = \text{Risk-free rate} + \text{beta} * (E(\text{market return}) - \text{Risk-free rate})$

For the risk-free rate, since Italy abandoned the Lira in 2001 and this analysis covers the time period 2004-2012, it seems more proper to the author to apply a euro interest rate instead of the interest rate of Italian government bonds. The risk-free indicator here applied is therefore the 10-year Eurirs. For the risk premia, the 1980-2000 geometric mean returns estimated by Dimson et al. (2002) are applied.

The beta parameter is estimated by the author using a two years time series of data of the daily FTSE Mib and FTSE Italia All-Share Financials indices.

This CAPM method suffers from many limitations widely explained in literature (i.e. Damodaran (1999), however, it can be considered adequate for the purposes of the present work, because it is unlikely that banks apply more sophisticated methodology for their internal estimation of this component.

Focusing on **Figure 6**, the decomposition framework seems to explain interest rates on new ARMs quite adequately. This is especially true for the period up to December 2006, which shows very low residuals (the mean of the absolute values equals 0.066%). In contrast, the interest rates calculated using the analytical framework are slightly higher than those set by banks in the time period January 2007- April 2009 (residuals average 0,24%).

The relative size of the credit risk charges changed considerably as time passed, though their importance remains significantly lower than that related to funding cost, throughout the time period in question. Specifically, the Expected Loss component increased dramatically just after the onset of the financial crisis, but then fell sharply. However, during the same time period, the capital charge component steadily increased.

Finally, outcomes from the above analytical framework clearly show that the main cause of the increase, witnessed in the discrepancy between ARMs interest rate and its indexation rate, was due to an increase in bank funding costs.

**Figure 7 and 8** show the results of the decomposition exercise for the interest rates on new FRMs. **Figure 7**, adopts the 10-year Eurirs for the whole time period, while **Figure 8** starting from the fourth quarter of 2011, applies a MFC that incorporates the cost of long term debt. As for new ARMs, by comparing **Figure 7 and 8** it seems that the main driver of the increase in the gap between the FRMs interest rate and its indexation rate was the stepping up of bank funding costs.

Looking at **Figure 8**, the residual component appears rather high for the entire period under analysis. Considering the sign of residuals it is possible to identify two distinct phases. A first period, ending March 2005, includes FRMs interest rates which are considerably below the level obtained by adding up funding cost and credit risk charges. A second period,

between January 2007 and August 2008, shows interest rates on new FRMs which are higher than the value resulting from the analytical framework.

An analysis of the determinants of the above residual component has been performed. In particular, the influence of the degree of competition and the presence of legal limitations on a cap on interest rates are explored. Since reorganization processes reveal cost reductions in the medium term, the hypothesis taken up here is that operating costs did not change significantly during the time period under analysis<sup>22</sup>, and therefore can not have considerably influenced lending interest rates.

To make a proxy of the level of competition two alternative variables are used: the Herfindahl-Hirschman index (HHI) of the household loan segment and an index of price heterogeneity (PHI). The HHI of the household loan segment is a proxy of the degree of concentration of the banking system published by the Bank of Italy for the period 2001-2011<sup>23</sup>. The index of price heterogeneity is computed by the author as the standard deviation the average Effective Annual Percentage Rate (EAPR)<sup>24</sup> as regards the new FRMs for the five main geographical areas of the countries. Data on EAPR of new FRMs that are provided on a quarterly basis by the statistical database of the Bank of Italy. The main advantage of this second index is that it is directly related to the FRMs market. Moreover, it allows us to appreciate any variation in the degree of competition with a more frequent recurrence than

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<sup>22</sup> Staff costs and other administrative expenses rose in 2008, 2010 and 2011, mainly for one-off items that included the cost of early retirement incentives, while the cost of wages and social security contributions remained unchanged since the onset of the financial crisis. Cf. Bank of Italy, Annual Report, various years.

<sup>23</sup> It is defined as the sum of the squares of the bank market shares, calculated using consolidated data for banking groups (with reference to Italian units only) and individual data for banks not belonging to a group. Bank of Italy (2011).

<sup>24</sup> It is the conventional summary of the cost of credit and it comprises all the up-front fees related to the mortgage contract (origination fees, monthly service charges and insurance premiums) and the compound interest rate, calculated across a year. For new term loans, banks report the EAPR of charge (as defined in Directive 87/102/EEC).

HHI. Finally it covers all the period under analysis. Its main limitation is that it comprises all the up-front fees related to the mortgage contract (origination fees, monthly service charges and insurance premiums), thus every observable variation in it is not directly related to the setting of interest rate conditions.

Since it is likely that, with a higher degree of competition, banks are forced to reduce their markup (with lower value of the HHI and higher value of the PHI) interest rates on new FRMs are likely to be lower than those resulting by adding up all the components of marginal cost. Thus, RESIDUALS are expected to show a negative sign. In contrast, with more market power (characterized by a higher value for the HHI and lower value for the PHI) interest rates on new FRMs are likely to be higher than those resulting after adding up all the components of marginal cost. Consequently, RESIDUALS are expected to show a positive sign. Therefore, the expected sign for the HHI is positive and that for the PHI is negative.

Regulation on usury interest rates imposes a legal limitation on capping interest rates, that is published every three months by the Ministry of the Treasury, giving data for different categories of lending contracts<sup>25</sup>.

Up to June 2004, residential mortgages interest rates had been capped without distinction between FRMs and ARMs. Seeing that the imposed ceiling was calculated on the basis of the average interest rate of new residential mortgages signed up during the previous quarter, and new mortgages were mostly ARMs in that period, the cap was particularly limiting for FRM contracts (Figure 9). Starting from July 2004, this problem was solved by imposing a separate ceiling for both FRMs and ARMs. A further modification in the calculation formula, which

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<sup>25</sup> Law 108/1996 introduced a cap on new lending interest rates.

came into effect in July 2011, allowed for a wide increase in the ceiling for each type of mortgage contract.

Considering the aims of the present investigation, focusing on the variation of the calculation criteria offers us more information than does merely tracking the absolute value of the ceiling. To this end, the following two dummies were built: FIRST-PHASE, which assumes the value 1 for the period January-June 2004, and THIRD-PHASE, which is used for the period starting from July 2011.

The hypothesis related to the FIRST-PHASE dummy is that, since the ceiling for FRMs was particularly severe for the period ending June 2004, it is likely that interest rates applied on new FRMs were lower than those resulting after considering all the components of marginal cost. Thus the expected sign for the FIRST-PHASE dummy is negative.

On the contrary, the expected sign for the THIRD-PHASE dummy is positive because it is likely that, after the relaxation of the legal limitation on interest rates, banks have increased their mark-up.

**Table 1** displays the results of a simple OLS model with the FRMs' residuals as dependent variable (RESIDUALS), with two alternative variables for the degree of competition (HHI and PHI) and two dummies for capturing the effects of the changes in the calculation method of the interest rate ceiling (FIRST-PHASE and THIRD-PHASE). Models comprise the dependent variable at time  $t-1$  as explanatory variable, in order to manage an autocorrelation problem<sup>26</sup>.

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<sup>26</sup> The series of data does not contain a time trend nor does it exhibit seasonality. Cf. Wooldridge (2006). The delayed dependent variable is significant in both model specifications. It alternatively means that lenders are likely to smooth over any fluctuation in interest rate in setting the price on new lending or, that lenders are inclined to compensate for estimation errors, made in the previous period, with the fixing of new lending prices. Cf. Generali et al. (2010); Button (2010).

Both model and explanatory variables are significant. Moreover, all the signs of the explanatory variables confirm expectations.

Some special attention should be afforded to the FIRST-PHASE dummy. This variable is significant in the first specification of the model (those with the HHI as proxy of the degree of competition, see [column 2 of table 1](#)) but it is not significant in the second specification of the model (those with the PHI, see [column 3 table 1](#)). To this end, it is worth remembering that the price heterogeneity index takes into account all the components of cost associated with a mortgage contract, which are related to different factors from those affecting interest rates. These components are less, or not at all, restrained by legal limits and transparency requirements. Looking at [Figure 10](#) some proof of the FRMs pricing policies have to be put forward. Firstly, the period ending in June 2004 was characterized by a low mark-up and a high value for the price heterogeneity index. Immediately after the relaxation in the interest rate ceiling, the mark-up jumped back up considerably, while price heterogeneity decreased. Therefore, it is likely that in the period January-June 2004 Italian banks balanced the restrictions which they used to set their interest rates, by increasing other components of the total cost. For this reason, the PHI could overestimate the effect already captured by the dummy FIRST PHASE. As expected, the outcomes of the OLS model are not affected by dropping FIRST PHASE from the explanatory variables ([table 2](#)).

An analysis of the factors influencing the level of the residuals emerging from the decomposition framework of the ARMs interest rates is not practicable, since those residuals are close to zero for a substantial part of the period under analysis.

However, by observing [Figure 11](#) it is interesting to find that, between the third quarter of 2007 and the end of 2008, interest rates on new ARMs are lower than those

resulting from the decomposition framework. Since that period is associated with the higher value of the Herfindahl-Hirschman index and a slow down in competition in the mortgage market, this evidence appears quite surprising. Considering that the ARM is most common mortgage contract in terms of both volumes and flows, it is likely that, in that “pre-crisis” period, banks had to iron out the sharp increase in the 3-month Euribor (Figure 1) by reducing their mark-up on new ARMs. Moreover, the high positive residuals observed in the same period from the FRM side of the mortgage market suggest that a compensation policy between the price setting of ARM and FRM had possibly occurred.

In conclusion, the analysis of the determinants of the residual component suggests that particularly strict legal limitations on interest rates may keep the interest rate setting by banks under the level obtaining carefully considering funding costs and credit risk charges, as seems evident in the FRMs market in the first half of 2004. In addition, a low degree of competition appears compatible with new mortgage interest rates above the level resulting adding up all the components of marginal cost. However, this evidence only emerges in the FRMs market for the period 2007-2008, when the highest degree of market concentration in the households loan segment existed.

Apart from the above considerations, the setting of interest rates on new FRMs and ARMs seems to differ only for the indexation rate adopted and, although interest rates on new ARMs and FRMs are linked to different indexation rates, the increase in bank funding costs, which occurred since the third quarter of 2011, have similarly affected their trend.

#### **4. Exploring the consequences on bank profitability**

Under normal market conditions, banks are able to pursue their lending objectives without affecting their margin, by appropriately setting mark-down and mark-up.

Since the onset of the financial crisis, disruptions in wholesale markets have seriously affected the Italian banks' margin for residential mortgages. More specifically, the simultaneous fall in short-term interest rates and an increase in the degree of competition in raising new deposits, has considerably reduced mark-down, cutting back profitability on both new mortgages and stock.

Figure 12 shows the evolution of Italian banks' margin on new ARMs and its components (mark-up<sup>27</sup> and mark-down<sup>28</sup>) over the period 2003-2012. As one can see, since the onset of the financial crisis, the margin has been considerably reduced. Not even the first important increase in bank spread, which occurred in the first half of 2009 (Figure 3), allowed Italian banks to completely compensate for the reduction in the mark-down component. Such compensation occurred, starting from the end of 2011, by changing the MFC used in setting new mortgage prices, as discussed in Section 3.2.

Consequences for the margin related to the outstanding volume of residential mortgages were even more severe. The present work carries out an attempt to document this effect. The analysis was run for the ARMs and FRMs separately, in order to capture how their returns were differently affected by the crisis.

Since there is no publicly available data concerning the composition of the outstanding volume of residential mortgages in terms of their origination date, residual duration of the

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<sup>27</sup> Computed deducting the average banks' MFC from the average interest rates on new ARM. For the MFC estimation procedure see Section 3.2.

<sup>28</sup> Computed deducting an average marginal composite deposit rate (MCDR) calculated on the basis of data from the statistical database of the Bank of Italy from the average banks' MFC.

contract and applied pricing conditions, the present analysis is based on some reasonable assumptions.

Firstly, the analysis estimates bank margins by applying the mortgage volume and the pricing conditions at the time of signing<sup>29</sup>. In addition, the analysis is based on the contracts taken out in the period January 2003-September 2012<sup>30</sup>, assuming that their original maturity was at least equal to the number of months required to arrive at September 2012. For example, those mortgages taken out in January 2003 have been assumed to have a maturity from the signing date of at least 9 years and eight months. Though it is not realistic to think that all the contracts had such a long maturity, this hypothesis is acceptable, considering that the average duration of Italian residential mortgages is roughly 20 years.

Therefore, both ARMs and FRMs are been divided into 117 clusters<sup>31</sup>, having the month of their signing as a basis. Then, an average interest rate return has been computed on a monthly basis for both of the contracts, starting from the onset of the financial crisis. Finally, bank margins have been estimated by deducting a monthly average composite deposit rate (ACDR), which was computed on the basis of data from the statistical data base of the Bank of Italy, from the monthly interest rate return.

Results are displayed in **Figure 13, 14 and 15**, respectively for ARMs, FRMs and the whole outstanding volume of residential mortgages.

As one can see from **Figure 13** the margins related to ARM contracts gradually diminishes after the onset of the financial crisis, dropping to around zero in the second half of

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<sup>29</sup> Interest rates, for the FRMs, and the bank spread over the indexation rate. for the ARMs, are taken as constant throughout the duration of the contract, thus assuming that no renegotiation procedures have occurred during the period under analysis.

<sup>30</sup> Data on volume and interest rate on new ARMs and FRMs are available starting form January 2003. The latest data published, at the time when this work was carried out, related to September 2012.

<sup>31</sup> Related to the months comprised between January 2003 and September 2012.

2012. Not surprisingly, the increased profitability of the mortgages taken out after 2012 (Figure 12) have had a limited effectiveness in preventing the fall in margins of the whole portfolio of ARMs, because the volume of mortgages signed up in that period was inferior to that from the pre-crisis period.

The dotted line in Figure 13 represents the average margin for the ARM contracts originated in the period November 2005 - October 2008, during which the bank spread on new ARMs greatly decreased (Figure 3)<sup>32</sup>. As expected, the effects of the financial crisis on bank margins have been more severe for the portfolio of contracts from that pre-crisis period of low mark-up.

The financial crisis did not seem to seriously affect the margin related to the stock of FRMs, due to their fixed interest rate (Figure 14). However, FRMs account for less than 50% of all mortgages, for more than two thirds of the period under analysis. It can be seen that the margin of the whole portfolio of residential mortgages was greatly affected by the performance of the ARM contracts (Figure 15).

Further concerns for Italian banks are likely to emerge when the 3-month Euribor will increase from the current very low value. Starting from the third quarter of 2011, two thirds of mortgages taken out were ARMs, which were characterized by a bank spread that was, on average, above 3%. Therefore, it is likely that banks will be negatively affected by the financial constraints experienced by borrowers, whenever the indexation rate increases in the future.

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<sup>32</sup> Those smaller spreads may symbolize the surprise effect triggered by a crisis whose progress has been largely unforeseen, both in intensity and speed. C.f. Magri and Pico (2010), Vacca (2011).

A final remark is related to the effects of the Italian sovereign debt crisis on Italian banking system competitiveness. In fact, the dramatic increase in the funding cost faced by Italian banks (section 3.2.) has hampered them in competing for new lending, compared with foreign institutions, which were able to set lower mortgage interest rates. To this end, a contribution by Felici et al. (2012) finds that the market share in the residential mortgage market of the five major Italian banks<sup>33</sup> witnessed a 10% decrease in the period 2004-2010, while foreign banks enjoyed a 19% increase in their share over the same period.

## **5. Conclusions**

The present work examines the causes of the anomalous trend of new residential mortgages interest rates, compared with the trend of their reference rates, which has occurred in the Italian mortgage market since the third quarter of 2011.

Outcomes from the interest rate decomposition framework clearly show that the main cause was the increase in bank funding cost. Moreover, though the credit risk components increased considerably during the period under analysis, their relative size remained significantly lower than that related to the funding cost throughout the same time period.

An analysis of the factors influencing the level of the residual component has been also performed. Outcomes suggests that particularly strict legal limitations on interest rates may restrain interest rate settings by banks under the level deriving from a prudent consideration of funding cost and credit risk charges, as happened to the FRMs market during the first half of 2004. In addition, a low degree of competition appears compatible with new

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<sup>33</sup> Major banks were faced with a great funding problem because they were traditionally more dependent on wholesale markets.

mortgage interest rates above the level which takes into consideration all the components of marginal cost. However, this evidence is only noticeable in the FRMs market for the period 2007-2008, which is associated with a high degree of market concentration in the households loan segment. No proof of market power effects are found in the ARMs side of the market in any period. To this end, it is worth noting that ARMs account for more than two thirds of the whole stock of Italian residential mortgages and the offer of initial rate discounts is widespread practice in the ARMs side of the market. Thus, the degree of competition is likely to be greater on the ARMs side of the market than on the FRMs side.

Apart from the above considerations, the interest rates setting for new FRMs and ARMs seems to differ only in the indexation rate adopted. Though interest rates on new ARMs and FRMs are linked to different indexation rates, the increase in bank funding cost, which occurred since the third quarter of 2011, affected their trend similarly.

The second part of the paper carries out an analysis of bank profitability of the residential mortgage market. It emerges that disruptions in wholesale markets considerably affected Italian banks' margins on both new lending and stock. In addition, pricing policies by Italian banks played a role in cutting profitability from the residential mortgage portfolio. With reference to the pre-crisis period, at the same time as the Euribor was increasing, Italian banks were supplying ARMs with a decreasing mark-up. The selection of higher credit risk borrowers was thus favoured. Moreover, the long-term profitability of the contracts was compromised, as the subsequent period when the Euribor decreased took place.

After the onset of the financial crisis, pricing policies by Italian banks were characterized by indiscriminate high bank spreads. Households' demand for residential mortgages was thus dampened. Moreover, householders with an ARM taken out with high

bank spreads are likely to face financial constraints, whenever the Euribor increases from its present extraordinary low value.

Since the starting point for the interest rate setting of the new ARMs does not coincide any more with the Euribor, a change of the indexation rate is required. Finally, the effects of the financial crisis on bank profitability regarding ARM contracts, and on borrowers' capacity to fulfil their mortgage obligations, both hint at an opportunity for Italian banks to change the relative convenience of choosing an ARM over an FRM, that characterizes the Italian mortgage market. To this end, ARMs could apply an indexation rate with a calculation period longer than 3-months, or if not, the pricing of new FRMs should incorporate a ten years fixation period, as is common practice in other European countries<sup>34</sup>.

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<sup>34</sup> Cf. ECB (2009), p.27.

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**Table 1 – Determinants of the level of the residual components for the FRMs**

Variables	Equation (1a)	Equation (1b)
	Coefficients (t-stat)	Coefficients (t-stat)
HHI	0.91** (2.82)	- -
PHI	- -	-0.43** (-2.31)
FIRST PHASE	-0.20* (-2.09)	0.13 (0.84)
THIRD PHASE	0.06 (0.83)	0.13** (2.00)
RESIDUALS t-1	0.64*** (8.64)	0.66*** (9.35)
Constant	-0.95** (-2.84)	1.00 * (1.91)
Adjusted R-squared	0.7202	0.6711
Number of observations	95	104

Dependent variable: RESIDUALS

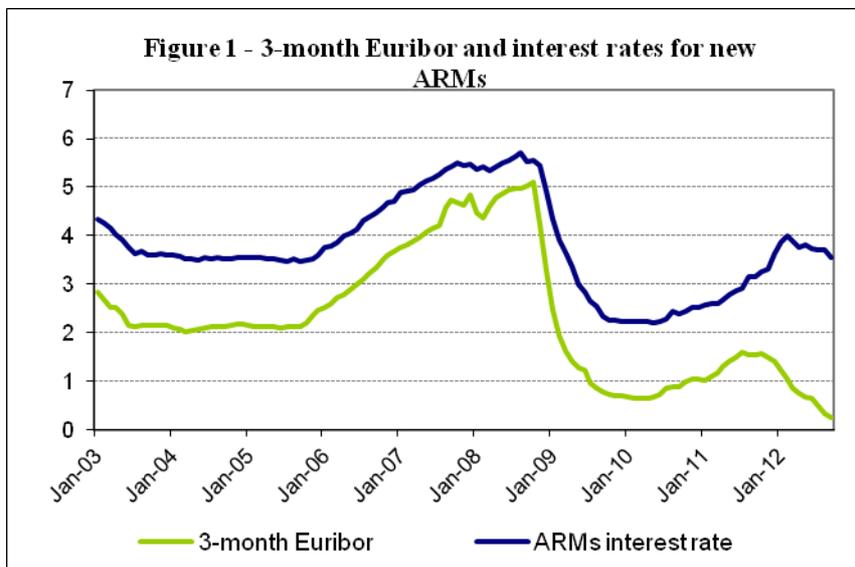
\*\*\* significant at 1% level; \*\* significant at 5% level

**Table 2 – Determinants of the level of the residual components for the FRMs without the FIRST PHASE dummy variable**

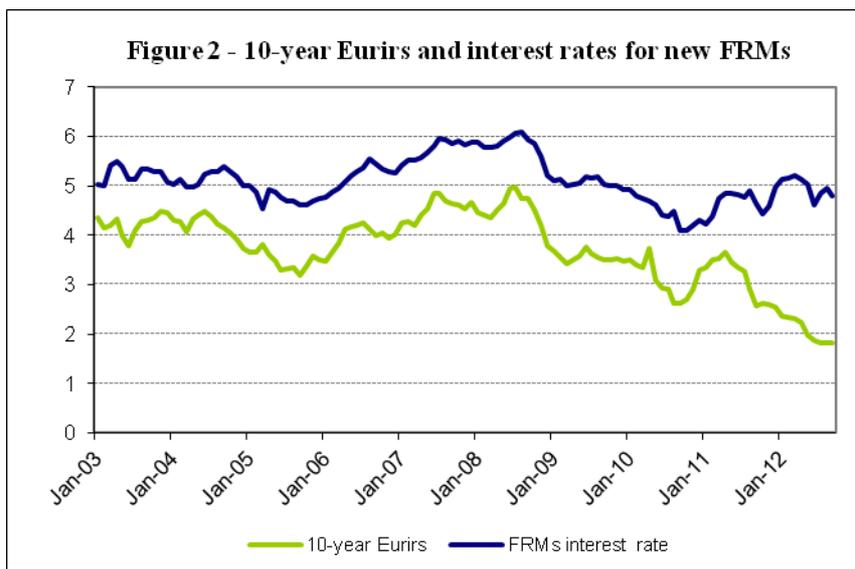
Variables	Coefficients (t-stat)
PHI	-1.02*** (-8.35)
THIRD PHASE	0.21*** (2.30)
RESIDUALS t-1	0.00 (0.88)
Constant	0.18** (2.48)
Adjusted R-squared	0.4297
Number of observations	104

Dependent variable: RESIDUALS

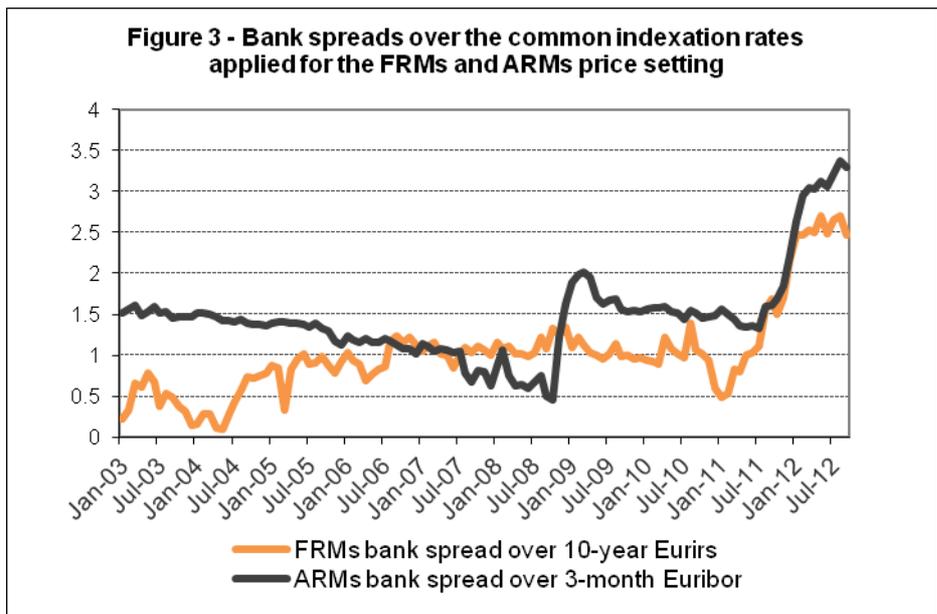
\*\*\* significant at 1% level



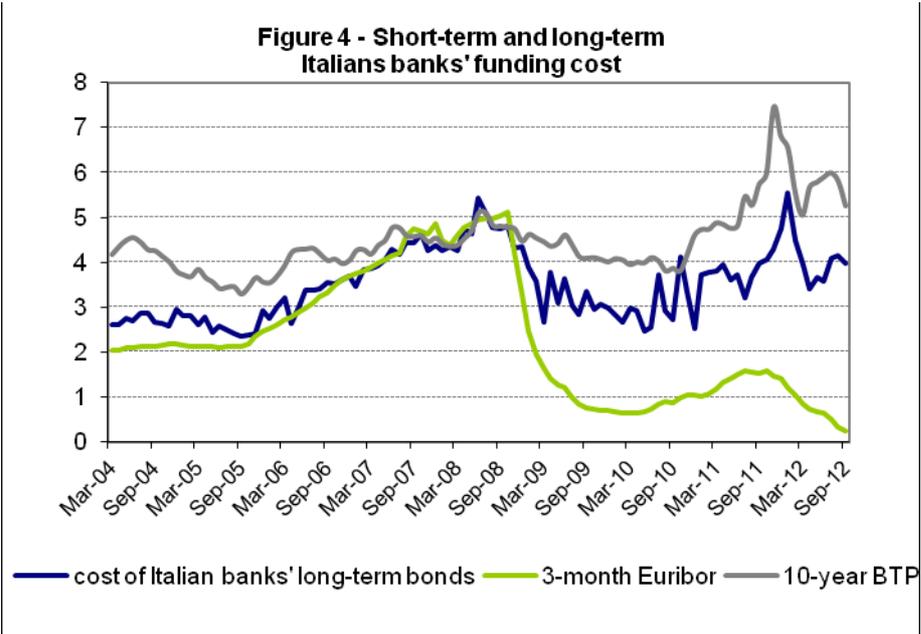
Sources: Bank of Italy and European Banking Federation



Sources: Bank of Italy and European Banking Federation

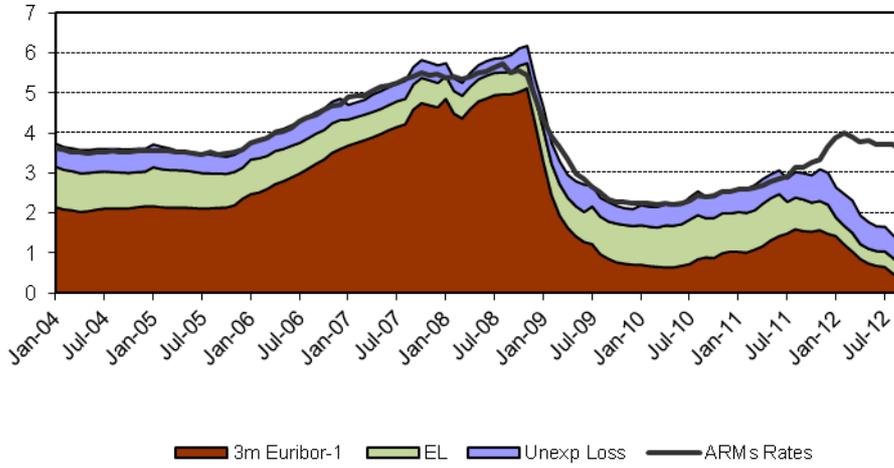


Sources: Bank of Italy, European Banking Federation and author calculations



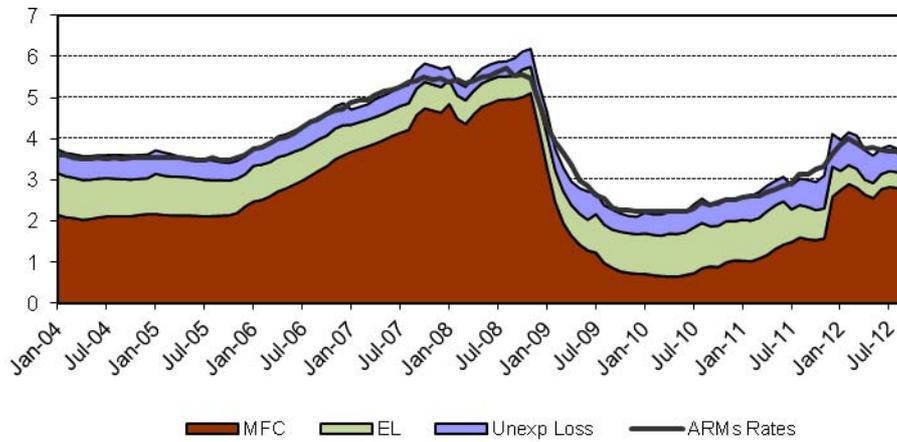
Sources: Bank of Italy, European Banking Federation and Ministry of the Treasury

Figure 5 - New ARMs rate decomposition with 3-month Euibor as MFC

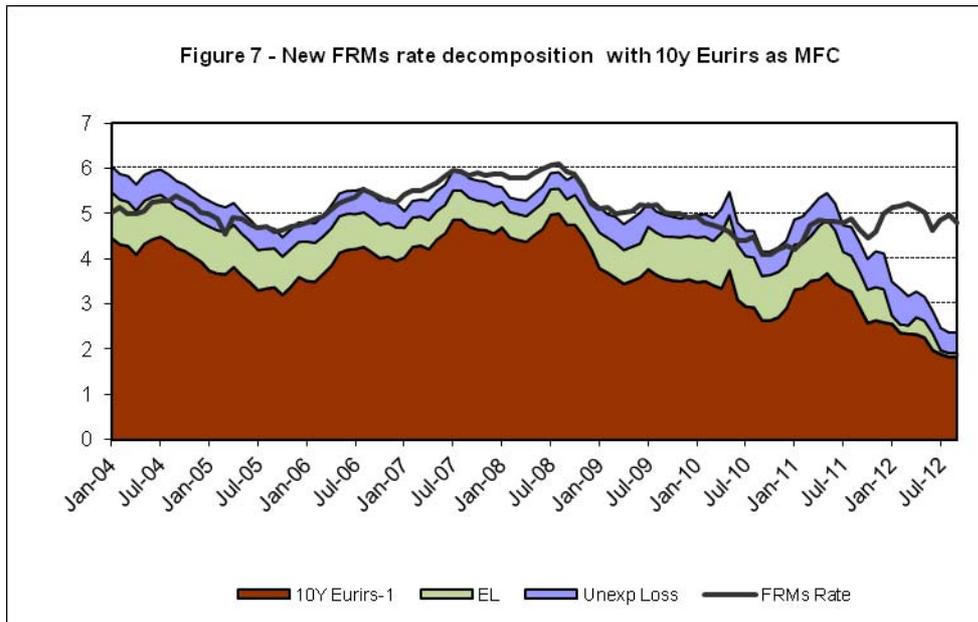


Sources: Bank of Italy, European Banking Federation, Borsa Italiana and author calculations

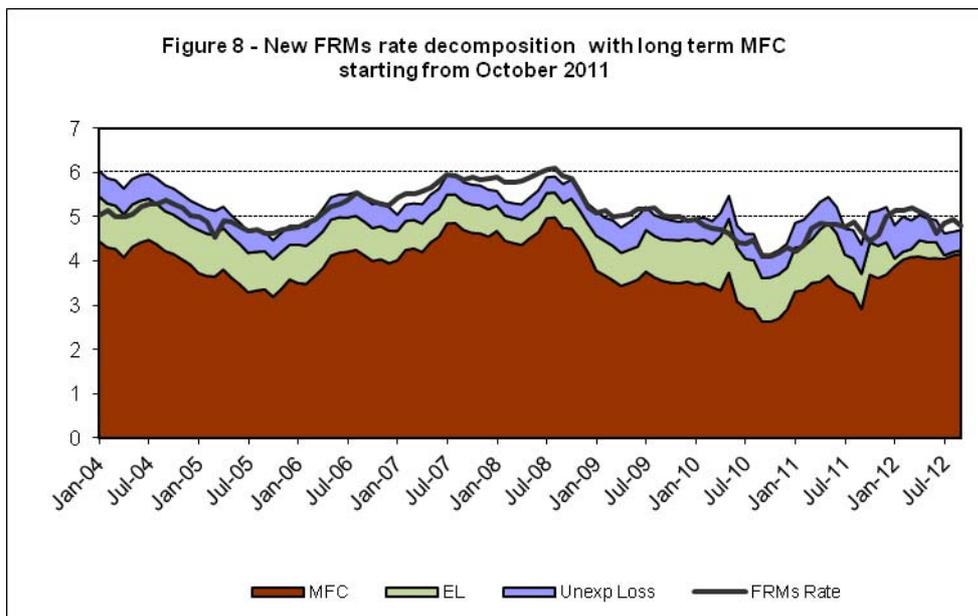
Figure 6 - New ARMs rate decomposition with long term MFC starting from November 2011



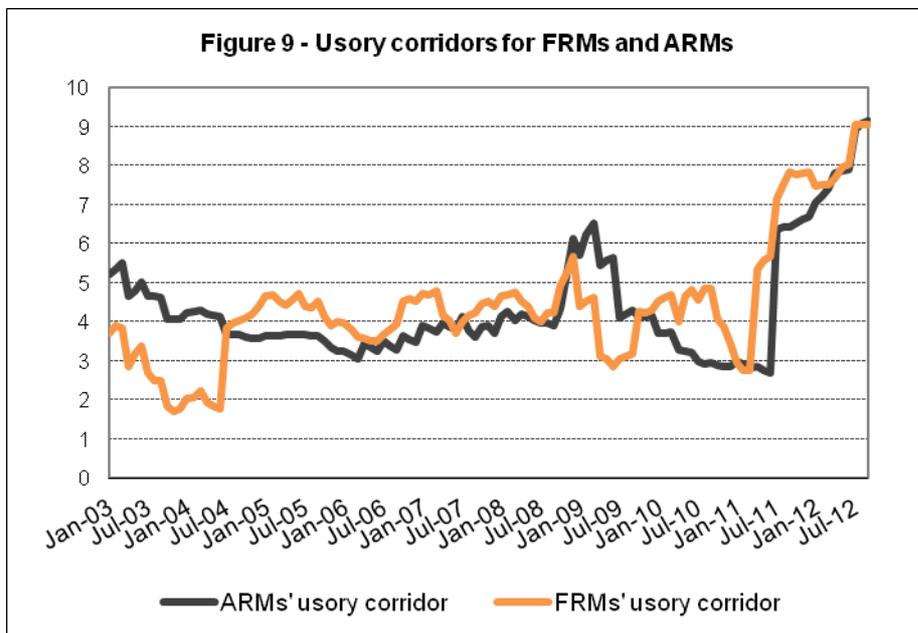
Sources: Bank of Italy, European Banking Federation, Borsa Italiana and author calculations



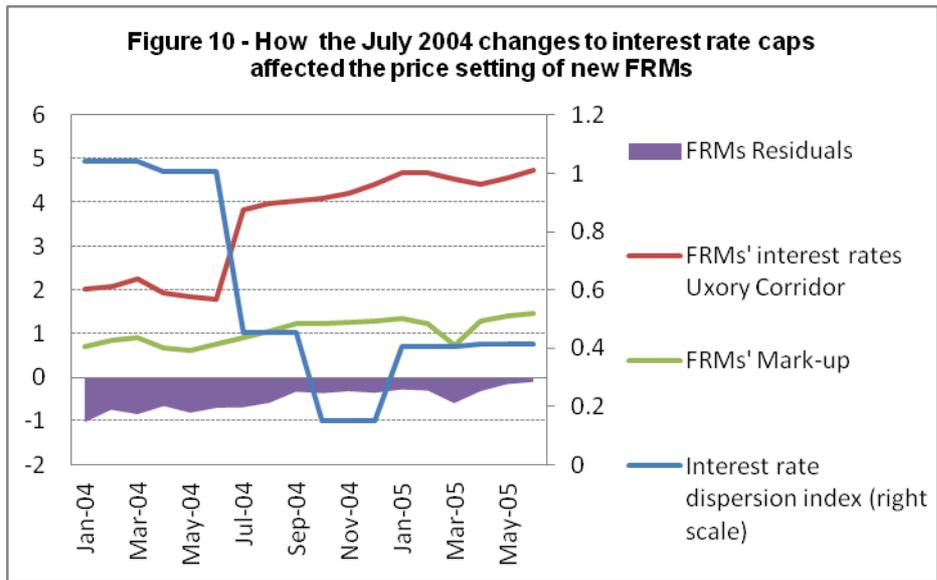
Sources: Bank of Italy, European Banking Federation, Borsa Italiana and author calculations



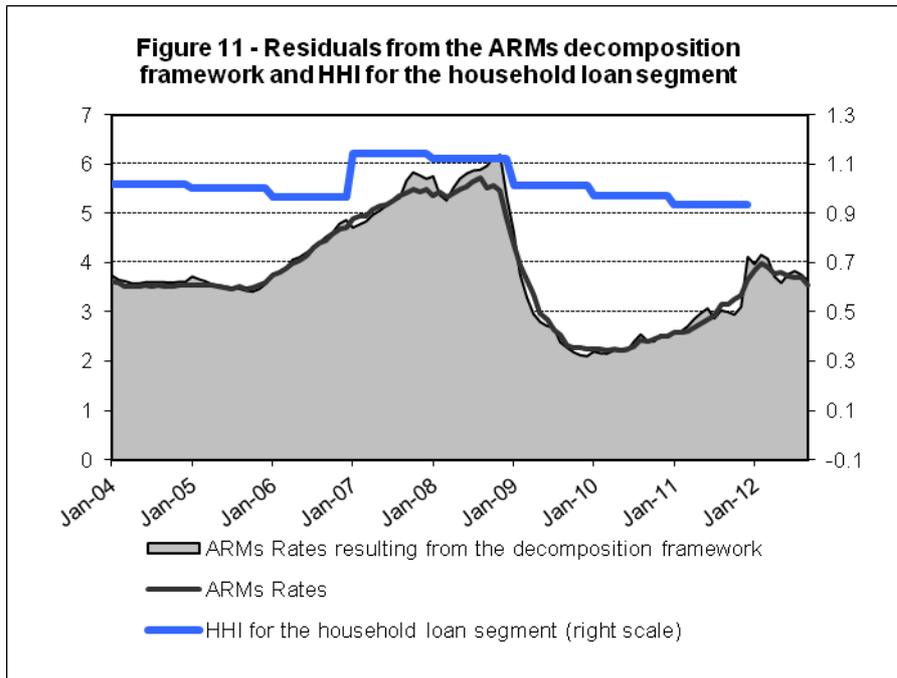
Sources: Bank of Italy, European Banking Federation, Borsa Italiana and author calculations



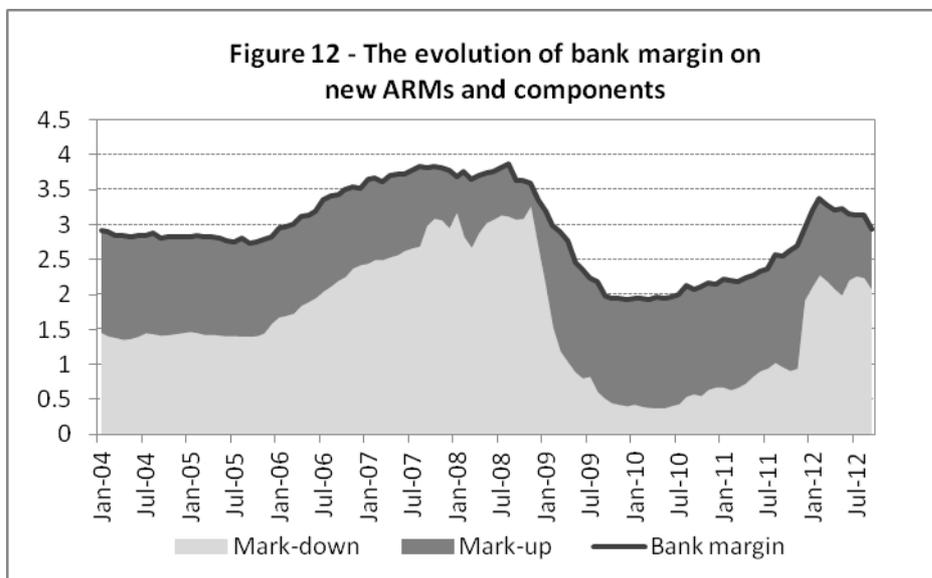
Sources: Ministry of the Treasury, European Banking Federation and author calculations



Sources: Bank of Italy, Ministry of the Treasury, European Banking Federation and author calculations

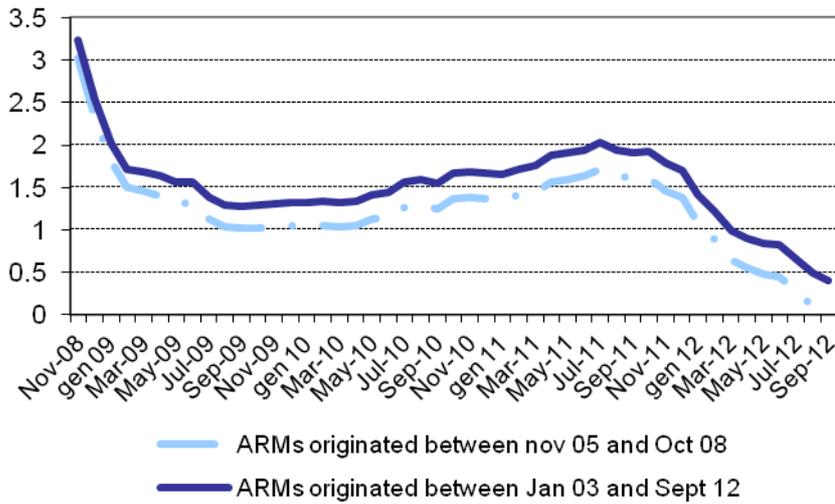


Sources: Bank of Italy, European Banking Federation, Borsa Italiana and author calculations



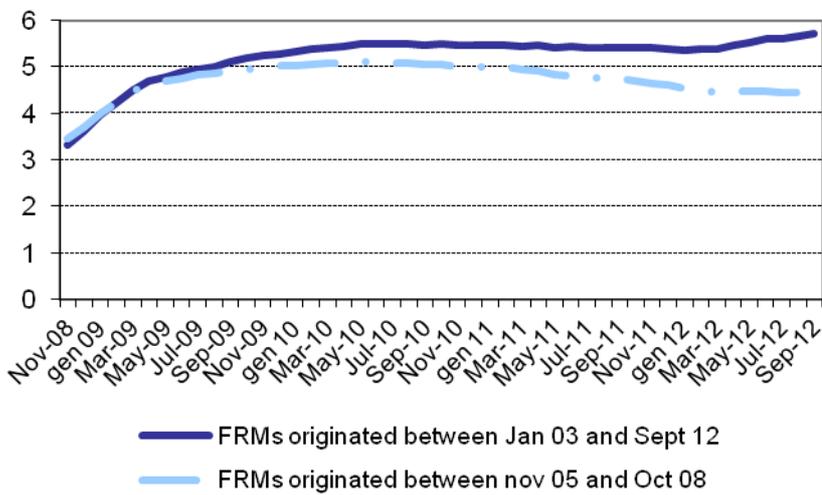
Sources: Bank of Italy, European Banking Federation and author calculations

**Figure 13 - Bank margin over ACDR for the portfolio of ARMs after the onset of the financial crisis**



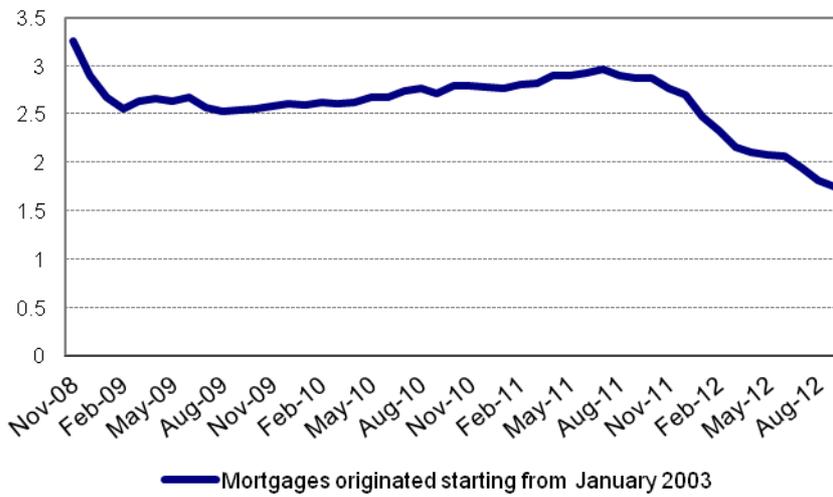
Sources: Bank of Italy, European Banking Federation and author calculations

**Figure 14 - Bank margin over ACDR for the FRMs originated in the period 2003 - September 2012**



Sources: Bank of Italy, European Banking Federation and author calculations

**Figure 15 - Bank margin over ACDR for the portfolio of residential mortgages after the onset of the financial crisis**



Sources: Bank of Italy, European Banking Federation and author calculations