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WITH (MORE THAN) A LITTLE HELP FROM MY BANK. LOAN-TO-VALUE RATIOS AND ACCESS TO MORTGAGES IN ITALY

by Danilo Liberati* and Valerio Vacca*

Abstract

This paper provides a framework to look at the affordability both of the regular repayment of housing debt (an income constraint) and of the initial deposit (a budget constraint). Analysis of the microdata on Italian households in the period 2006-2012 indicates that the improved capability of households to maintain their mortgage repayments was counterbalanced by tighter budget constraints. The framework can be employed as a tool to assess the impact of macroprudential policies, such as caps on loan-to-value ratios (LTVs), on the pool of households who can access mortgage loans without running into financial distress: the level and the slope of the 'mortgage affordability curve', the curve that shows the share of eligible households at different LTVs provided by the banks, change over time and depend on the definition of household wealth. The 2008-09 crisis lowered the share of eligible families at high LTVs and slightly increased it at lower LTVs. Moreover, we find that mortgage capability worsened more for the middle class and that the decline in Italian LTVs across the period was mainly supply driven, whereas household preferences barely changed. Finally, alternative policies affecting mortgage affordability display heterogeneous effects both in increasing households' market participation and in fostering safer lending policies.

JEL Classification: D12, D14, G21, R31.
Keywords: mortgages, housing affordability, loan-to-values, household finance.

Contents

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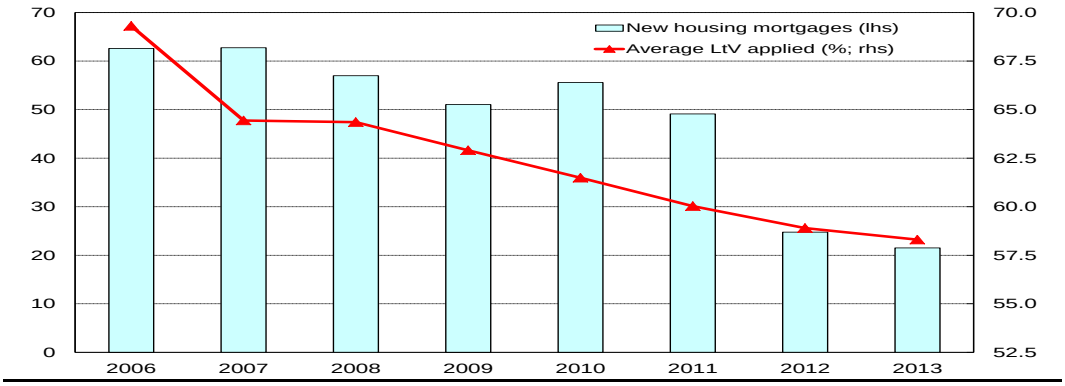
1 Introduction and motivation[1]

One stylised fact in the recent evolution of Italy's mortgage market is the gradual decline in the percentage of a property's worth financed by the mortgage lender (the loan-to-value ratio or LTV). Figure 1 shows that this decline was accompanied by a shrinking of new mortgages granted to Italian households; against this background, the extent to which declining loan-to-values affected the overall capacity of families to purchase houses through a mortgage remains controversial. The question is also relevant from a policy point of view, in order to figure out to what extent imposing caps on the LTVs that banks can offer curbs households' ability to access and sustain a mortgage.

Figure 1

New mortgages and average loan-to-values in Italy (1)

(billions of euros and per cent)



(1) Source: Bank of Italy, supervisory reports for new mortgages and Regional Bank Lending Survey (RBLS) for loan-to-values.

Traditional mortgage affordability indexes focus on the sustainability of the repayment burden of a mortgage, i.e. the weight on the family income of the periodic outlays for principal and interest repayments. However, a broader concept of ease of access to mortgaging a house also takes into account the feasibility of the initial payment of the dwelling's value, which is not covered by the bank, i.e. the equity a homebuyer injects by way of a down payment or deposit. In this context, LTVs play a pivotal role since higher ratios increase the repayment burden of a mortgage and reduce the initial liquidity constraint on potential homebuyers. Thus, the LTV also modifies the balance between the lender's and borrower's point of view: it determines how leveraged the borrower's proposed investment will be, and therefore also its riskiness for the lender. This leads to financial stability considerations related to LTV levels, which have in fact been given widespread attention in the recent literature.

The main novelty of this paper is that it assesses the feasibility of house purchases through mortgages for Italian families taking into account both the periodic repayments and the initial deposit burden. This approach is applied to Italian micro-data to investigate the impact of caps on LTVs, the changes that have occurred in recent years in the ability of heterogeneous families to access and sustain a mortgage, and the effects of policies designed to enhance sustainable access to homeownership through mortgages. Italy is certainly an interesting case for this

[1] The opinions are those of the authors alone and do not necessarily reflect those of the Bank of Italy. We wish to thank Giorgio Albareto, Riccardo De Bonis, Luigi Cannari, Giorgio Gobbi, Silvia Magri, Matteo Piazza, Maria Lucia Stefani, Francesco Zollino and the participants in a seminar held at the Bank of Italy in December 2013 for their useful comments. Any residual errors are ours alone.

topic: despite recording a gradual increase just prior to the financial crisis, in cross country comparisons average LTVs in Italy have been consistently low, ensuring prudent lending policies on the part of the banking system. Furthermore, as early as twenty years ago Guiso et al. (1994) remarked on the role played by LTVs in shaping housing affordability for Italian families.

This paper is organised as follows. After a brief review of the literature in section 2, section 3 introduces a framework for assessing the access to housing through sustainable mortgages. Based on this framework, section 4 traces the evolution of mortgage affordability[2] in Italy over the period 2006-2012, whereas section 5 deals with the impact of different LTVs. Sections 6 and 7 describe the situation of heterogeneous households, also accounting for alternative notions of wealth and the possibility of parental gifts. Section 8 shows how the framework can be employed to assess the outcomes of alternative policy scenarios in enhancing sustainable access to housing mortgages. The final section concludes.

2 Related literature

The relationship between housing finance and credit dynamics has received much attention in recent years (see Guiso and Sodini, 2012, for a recent review on household finance). The optimal mortgage choice and accessibility of an affordable shelter changes dramatically for heterogeneous households. Modifications in credit supply conditions affect both the actual situation faced by potential homebuyers (with consequences for the purchase of houses) and the stability of the financial sector.

As regards housing affordability many studies, especially on the US, Canadian and UK markets, have shown that its dynamics cannot be studied without taking into account differences in households' demographic and economic features, and in income especially (Quigley and Raphael, 2004). Furthermore, access to housing by different income classes might be unevenly affected by economic swings. As regards Italy, and like this paper based on sample surveys, D'Alessio and Gambacorta (2007) conclude that already before the 2008-2009 crisis housing distress was far from absent amongst Italy's households.

Access to mortgages is a key driver of housing affordability. Vissing-Jørgensen (2007) shows that households might improve their liquidity situation by optimising the management of their principal repayment, whereas Agarwal et al. (2008) derive a closed-form solution for optimal mortgage refinancing. Bonaccorsi di Patti and Felici (2008) analyse the link between some individual characteristics of Italian mortgagors and the riskiness of the loan: they find that the risk of encountering difficulties in payments is greater for younger borrowers, for those resident in Italy's southern regions and for immigrants from non-EU countries.

Specific attention has been devoted to down payments and the resultant periodic repayment burden. Writing on mortgage default behaviour under different types of loan, Campbell and Cocco (2011) argue that both high debt-service-to-income ratios and high loan-to-values increase the probability of default. Read, Stewart and La Cava (2014) find that the probability of entering arrears increases both with LTVs at origination and with the contract's interest rate.

[2] In this paper the notion of "mortgage affordability" for a family refers to both access to the housing loan and its sustainability. We also employ expressions like "access to mortgages" or "access to the housing market" to define concepts like "*sustainable* access to mortgages" and "*sustainable* access to the housing market".

Down payments are a major bottleneck for youngsters: first-time homebuyers, on the one hand, target lower down payment ratios and, on the other, must often rely on parental gifts – rather than on their own saving capability – to make the house purchase (Engelhardt and Mayer, 1996). As for the Italian market, Guiso et al. (1994) showed that in the 1990s high down payments were a key financial constraint on young Italian households, and argued that intergenerational transfers were unlikely to overcome these market imperfections. Mortgage affordability for heterogeneous households and the role of intergenerational transfers will be tackled in sections 6 and 7.

Both theoretical and empirical models emphasize the risk of underplaying the role of the initial liquidity injection. Torluccio and Dorakh (2011) propose a framework to identify potential borrowers and the types of household for which bank lending conditions would be acceptable, taking into account down payments in addition to repayment burdens. From an empirical point of view, McCord et al. (2011) warn that disregarding budget constraints on homebuyers might lead to the detection of a 'false dawn' after the 2007 correction in mortgage markets, i.e. an apparent but misleading improvement in housing mortgage affordability: in those years a lower periodic debt burden on incomes was simply the outcome of the significant capital requirements needed to access the mortgage market, stemming from more conservative bank lending. In section 4 we will illustrate how much the assessment of mortgage affordability developments is affected when explicit account is taken of the entire financial burden of mortgaging a house; in section 5 we use both concepts (repayment burden, down payment burden) to figure out how many households can access a sustainable mortgage at different LTVs.

Balta and Ruscher (2011) introduce the concept of a *down-payment channel* in the interactions between household wealth, mortgage decisions and savings, suggesting that more burdensome initial payment requirements should trigger a higher propensity to save. However, this is not always the case: with reference to the Chinese market Wang and Wen (2012) show that mortgage conditions (i.e. the required initial deposit, given housing prices) do not perfectly translate into the observed saving rates of eligible households, suggesting a 'saving rate puzzle'. Homeownership-raising policies might narrow the gap between the economic situation of households and market conditions: the recent literature finds that down-payment subsidies are more effective and less costly than interest rate subsidies in enlarging the pool of successful homebuyers, whereas Quercia et al. (2003) show that 'affordable lending' efforts have asymmetric effects on heterogeneous tiers of households (e.g. are weaker for recent movers or the inhabitants of large cities). A recent report by McKinsey (2014) suggested that collective saving schemes might enhance the financing of house purchases, especially in emerging markets. Lang and Hurst (2013) show that public help for down payments alters the financial decisions of potential mortgagors, all in all leading to a safer choice of down-payment ratios: in section 8 we show that policies simulated within our framework produce results that mirror very closely the actual outcomes of policies implemented in other countries or periods.

Turning to the effect of credit supply conditions on house purchase and on the riskiness of credit extended to the household sector, some studies deal primarily with the macroeconomic aspects of housing loan supply, which are outside the scope of this study. Kuttner and Shim (2013) employ data from 57 countries to analyse the effectiveness of nine non-interest rate policy tools in stabilizing house prices and housing credit. They find that housing credit growth is significantly affected by ceilings on LTV ratios and, more effectively, on debt-service-to-income ratios.

Hatchondo et al. (2013) calibrate a standard incomplete market model to show that imposing minimum loan-to-values simultaneously affects mortgage defaults, home ownership rates and housing prices. As a conclusion, the authors suggest that the Qualified Residential Mortgage rules proposed in the U.S., whereby restrictions on LTVs would be accompanied by more favourable interest rates, might trigger a lower home ownership rate, causing policymakers to face a trade-off between market access from the part of households and financial stability. The IMF has devoted special attention to the role of LTVs. Mian and Sufi (2010) point out that the leverage experienced by US families in 2006 was a powerful predictor of how hard the different geographical areas would be hit by the subsequent recession. Ceilings on LTVs allow limits to be placed on the leverage of the family sector, in the same way as capital ratios limit the leverage of the financial sector; this macroprudential tool reduces both households' default ratio and demand pressure on house prices, thus preventing an asset price bubble from building up (Crowe et al., 2011). The effect of LTV limits in fostering financial stability is confirmed by data based on Hong Kong's experience (Wong et al., 2011), while Ono et al. (2014) claim that caps are ineffective in a market like Japan, where LTVs recently exhibited counter-cyclical patterns. Limits on LTVs have been applied by many countries, though rarely in advanced economies – with a few notable exceptions – and are judged a suitable policy tool to prevent the build-up of household debt overhang (IMF, 2011; Borio and Shim, 2007; Panetta, 2013).

3 A 'comprehensive' approach to housing through mortgages

3.1 Analytical framework

In assessing the burden of a housing mortgage the points of view of both the mortgage lender and the potential homebuyer should be taken into account. From the lender's point of view, the borrower's ability to afford the debt repayment as a share of income is the main concern, whereas from the homebuyer's point of view the feasibility of the initial payment also comes into consideration, in addition to the repayment burden.

We therefore complement a standard repayment-based index, which takes into account the sustainability of the mortgage (see (1) below), with an initial payment-based index (see (2) below) which looks at the actual accessibility of the mortgage market. The joint consideration of the two indicators allows us to assess access to the housing market through a sustainable mortgage.

Repayment-based mortgage affordability is traditionally gauged through what Lang and Hurst (2013) call 'the income constraint', i.e. the burden on income of the periodic outlays to repay the mortgage (Kutty, 2005, Girouard et al., 2006). A standard index based on mortgage repayments (Income Constraint Index, *ICI*) refers to a benchmark threshold, α:

$$ICI = \alpha / \left(\frac{instalment(r, T, P, LTV)}{Y} \right) \qquad (1)$$

In the expression (1), α is the maximum percentage that a family should ideally devote to service the mortgage without facing a significant risk to run into financial distress, r is the interest rate on a real estate mortgage for households, T is the mortgage maturity, P is the price of standard size dwellings, LTV is the percentage of

the price funded through the mortgage loan (loan-to-value) and Y is the households' disposable income.

Turning to the down-payment side of the house-mortgaging problem, in principle it should be performed through the wealth W accumulated by the homebuyer in the run-up to the mortgage decision.[3] Therefore, we gauge the feasibility of the initial payment using the following ratio, labelled the Budget Constraint Index, *BCI* (see Lang and Hurst, 2013):

$$BCI = \frac{W}{P \cdot (1 - LtV)} \qquad (2)$$

Both the income constraint and the budget constraint indexes have a threshold value of 1, with values above unity suggesting relative ease of access to a sustainable mortgage for a standard house. This framework can be used to assess access to housing through a mortgage: after a preliminary analysis of the dynamics of the two indexes (section 4), we look at the share of families who can mortgage a house with a reasonable burden of debt repayment *and* sufficient endowments to make the initial payment (see sections 5-8).

3.2 Data and definitions

Data sources. – To implement formulas (1) and (2) for the Italian market we rely on detailed data for the period 2006-2012 from several sources: income, savings and wealth are drawn from micro-data from the Bank of Italy's biennial survey on household income and wealth (SHIW), which we employ up to the 2012 wave; mortgage supply conditions from the Bank of Italy's Regional Bank Lending Survey (RBLS), and the survey on loan interest rates; house prices from the Real Estate Market Observatory; the link between LTVs and interest rates is estimated through the quotes displayed on the website mutuionline.it (see the methodological appendix).

Definition of W. – Special attention is devoted to the definition of household wealth (W).[4] In the broadest and most widely accepted meaning, W is the sum of the real assets (W_{ra}) and net financial assets (W_{nfa}) owned by a family: then $W = W_{ra} + W_{nfa}$. For the specific purposes of this paper, however, this definition has some drawbacks: some real assets – notably the owned home – might be difficult to sell off to finance the initial liquidity required by the mortgage lender. In Italy homeowners, who represent over 70 per cent of total households, are experiencing long and increasing lead times to liquidate their real assets (time on market; Bank of Italy, 2015). Furthermore, including own homes within the wealth available to a family to make the down payment might lead to the puzzling result that *rising* house prices might make it *easier* to mortgage a standard apartment, since the wealth of the families is enhanced (the numerator of the (2) grows).[5] This is why we adopt a

[3] The literature has also highlighted the importance of parental gifts in housing decisions (Engelhardt and Mayer, 1996). We will explicitly consider the availability of gifts in section 7.

[4] See D'Alessio (2012). As shown by Bartiloro and Rampazzi (2013), based on SHIW data Italian households' wealth – in particular financial wealth – and the propensity to save decreased during the crisis: depending on what definition of wealth is adopted these dynamics can affect the tightness of the budget constraint as highlighted by (2).

[5] The net effect of rising house prices on our index depends on the magnitude of the price impact on households' wealth (the index numerator, which is affected by housing prices only if the definition W_1

modified definition of W as our benchmark, whereby the value of the owned home where the family lives (if any) is deducted from total wealth: $W_1 = W_{ra} + W_{nfa} - W_{own\ home}$.

Alternative definitions can be envisaged for the available resources to make the initial deposit. Some of these will be used in section 7 to provide a sensitivity analysis of the possible outcomes.

3.3 Assumptions

Our mortgage affordability index is intended to be a theoretical indicator; as a consequence, the parameters to be plugged into formulas (1) and (2) cannot be entirely retrieved from empirical data. We make the following hypotheses about parameters.

Standard home size. – We consider a standard size for dwellings equal to 100 m^2, which allows us to observe a price effect unaltered by the changing size of homes actually bought and sold in the market.

Conventional threshold for debt-to-service ratio. – Following a widespread benchmark in housing literature, the recurrent burden of repaying a mortgage is deemed affordable if it is below 30 per cent of a household's disposable income, as set out for example by the US *Cranston-Gonzalez National Affordable Housing Act*. As a consequence, we set $\alpha = 0.30$ in (1).

Interdependence of LTV and interest rates. – The *LTV* and the *r* variables in (1) are assumed to be linked by a relationship, since higher LTVs imply higher leverage of the house purchase, which banks should translate into tighter interest rate conditions (see also Magri and Pico, 2011, on the link between mortgage risk and rates in Italy).[6] We therefore estimate such a relationship for Italian mortgages, following previous evidence based on the US market (see, for example, Titman et al., 2005), where different mark ups are linked to specific LTV thresholds. The main jump in rates is found above the 80 per cent LTV threshold. See the methodological appendix for details. The estimated LTV-rates relationship will be used when different LTVs are hypothesised, departing from real-world data, in sections 5-8.

4 The evolution of access to housing mortgages in Italy revisited

In this section we show that the assessment of recent changes in Italian families' ability to access and sustain housing loans varies greatly under a more complete approach with respect to the one which only takes into account the income constraint, and that the role played by the different driving factors in affecting these changes should also be reassessed.

Based on real-world data (and in particular real-world average LTVs applied in the Italian mortgage market), Figure 2 compares the evolution of a standard repayment-based mortgage affordability index (the income constraint index, based on

is adopted) and on the value of a standard apartment (the index denominator). On this point, Muellbauer (2008) shows that higher housing prices produce, in aggregate terms, small and marginal wealth effects: if, on one hand, consumption could increase following a rise in the value of owned homes, on the other hand, aspirant homebuyers must increase their propensity to save in order to buy their desired home (first time buyers) or to trade up their current accommodation (homeowners); Slacelek (2009) even estimates a negative housing wealth effect for Italy.

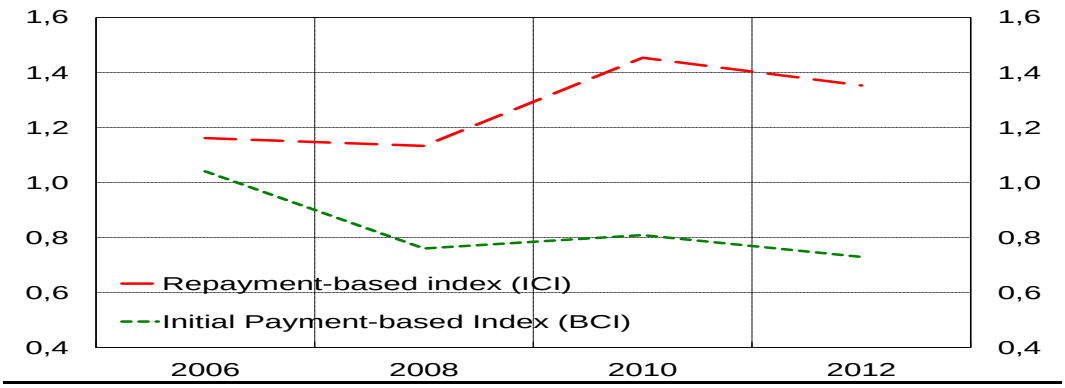
[6] As explained by the authors, the dynamics of the mortgage interest rate and its link with credit risk depend on a variety of factors linked to households and lenders' characteristics, including LTVs.

formula (1) above), with down-payment affordability (the budget constraint index from formula (2) above). The repayment-based index has improved across the whole period 2006 to 2012, although it did exhibit swings in sub-periods. By contrast, the feasibility of the initial payment steadily decreased over the same period, mainly due to the more conservative (i.e. lower) LTVs prevailing on the market. As a result, the improvement between 2006 and 2012 in the ability of Italian households to sustain a mortgage highlighted by the debt-repayment index is somewhat attenuated, once both the income and the budget constraint are accounted for. All in all, we can conclude that the simple repayment-based index detects a "false dawn" in the ability of Italian households to mortgage a house (see McCord et al., 2011).

Figure 2

Sustainability and accessibility indexes (2006-2012) (1)

(index)



(1) The chart plots an index of accessibility to the mortgage market (BC) and an index of sustainability of the agreed mortgage (IC).

Figure 3 illustrates the role of the different factors in driving a wedge between the usual concept of mortgage sustainability and that of accessibility.[7] In the years around the inception of the economic and financial crisis, the gradual decline in LTVs prevailing on the Italian credit market greatly contributed to alleviate – *de facto* – the income constraint and to boost the mortgage-repayment index. The cumulative contribution of the LTV was always greater than that of any other factor and determined almost two thirds of the total variation of the index in every year (yellow areas in Figure 3a). By contrast, when we focus on the down payment indicator, we observe a sizeable negative contribution of the LTV (Figure 3b): considered together, the two indexes highlight the two-faceted role played by the decline in LTVs applied by Italian banks after 2006 (easing the income constraint, worsening the budget constraint) and suggests that the progressively more conservative bank supply stance over the period produced – all in all – a dumped impact on mortgage affordability.

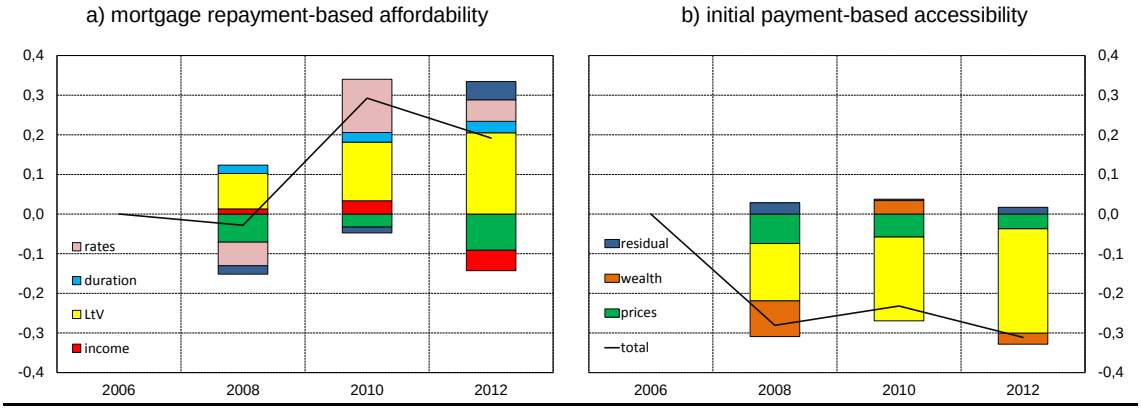
As regards the other factors, interest rates have a positive impact over the whole period only on the repayment-based index whereas the change in wealth has only a mild effect on the index based on down payments, especially during the early years of the financial crisis. The income and the mortgage average duration only affect the repayment burden. Finally, the role of house prices is basically the same in the repayment-based index as in the initial payment index, since lower (higher) prices improve (worsen) both.

[7] The evolution over the period of the different components of the indexes is plotted in Figure a1 in the appendix.

All in all, the joint assessment of both indexes suggests that in the years under review the change in interest rates was the most important single factor in enhancing households' ability to sustain a mortgage to buy a standard home. The impact of interest rates, however, was offset by the drop in households' income and wealth and by the rise in house prices. The decline in LTVs, apparently very positive if the budget constraint is disregarded, had a small overall impact over time.

Figure 3

Factors driving the changes in housing mortgage affordability (2006-2012) (1)
(percentage values)



Source: see the methodological appendix.

(1) The different areas of the bars show the cumulative contribution of each factor to the change in the indicator from 2006 up to the relevant year on the horizontal axis (positive values if the factors lead to a higher value of the index, negative otherwise).

5 Access to mortgages under different loan-to-values

In this paragraph we use household-level data to analyse the share of families eligible for a mortgage at different loan-to-values. We take into account that as LTV grows the risk for the lender increases *coeteris paribus*, and this translates into higher interest rates applied by the bank (see section 3 and the methodological appendix).

The number of households that can access a mortgage without facing a significant risk to run into financial distress ('eligible' households)[8] increases, by definition, as higher LTVs become available on the market. For every increase in LTVs, additional households become eligible, i.e. those for which low LTVs were actually a bottleneck and for which repayment is not a constraint, in spite of the larger mortgage size due to larger LTVs. In other words, the curve of LTV *versus* eligible households increases monotonically in LTVs: households with access to the mortgage market target the maximum LTV that enables a sustainable repayment.

Figure 4a plots the percentage of households that could afford a mortgage in both respects (debt repayment burden, initial payment burden) in relation to different loan-to-values, which might in principle be applied by the mortgage lenders. The plotted curves refer to the year 2012, the last year for which the SHIW data are available in our dataset, and the year 2006, a benchmark for the period before the Lehman collapse. The curves in Figure 4 can be interpreted as the sustainable mortgage affordability frontier for Italian households under different LTVs, holding other supply conditions constant.

Figure 4a shows that between 2006 and 2012 the share of mortgage-eligible households increased for low loan-to-values (up to about 70 per cent), while it

[8] For the sake of brevity we label the families t can access and sustain a mortgage 'eligible' households.

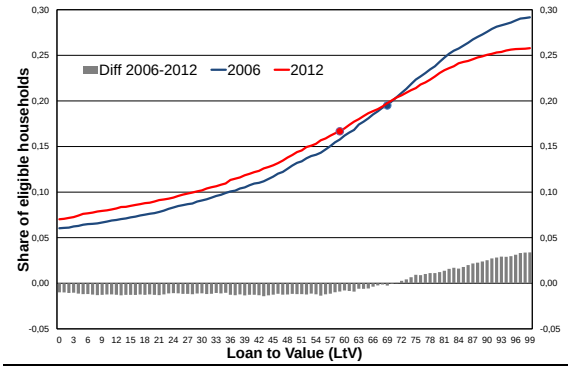
decreased for higher loan-to-values. Therefore, the crisis made the mortgage affordability curve flatter and the impact of more generous LTVs smaller: the main reason for this outcome was the drop in households' incomes between 2006 and 2012, which prevented mortgagors from exploiting higher LTVs, due to the increased importance of the income constraint with respect to the budget constraint.

This finding allows us to gauge the effect of possible caps on LTVs applied by the lenders, under the assumption that the other constraint is fulfilled, i.e. the debt service ratio does not exceed 30 per cent of household income. This exercise suggests that LTV caps have different impacts on households' access to mortgage markets depending on the conditions prevailing on the market and the living conditions of households: for instance, setting a 70 (80) per cent cap on LTVs instead of 100 per cent would have reduced the share of eligible families by 9.2 (4.9) percentage points in 2006, but by just 5.7 (2.7) points in 2012.

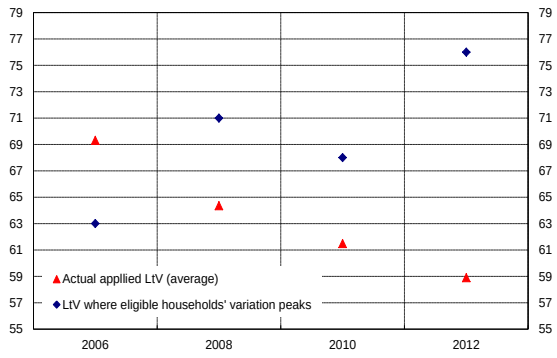
Figure 4

Access to housing mortgages at different LTVs: 2006 - 2012

(a) *percentage of families with access to sustainable housing mortgages* (2006 and 2012) (1)



(b) LTVs (%) which maximise the marginal increase of mortgage access for Italian families and actual LTVs applied by banks (2)



Source: see the methodological appendix.

(1) The chart displays the share of households with access to sustainable mortgages; the dots show the actual average loan-to-values prevailing in the Italian market in 2006 (blue dot) and 2012 (red dot), according to the Bank of Italy's RBLS survey. The bars display the difference between the 2006 and 2012 share of families. – (2) The chart displays the loan-to-value percentage which maximises, in each year, the increase in the share of Italian households that could afford the initial payment (by using their wealth, net of the first residential homes' value) and whose repayment burden was below 30 per cent of income. Actual LTVs (red dots in panel b) are retrieved from the Bank of Italy's RBLS survey.

Given the S-shape of the LTV-mortgage accessibility curve, higher LTVs enlarge households' participation in the mortgage market to different degrees at different LTV levels. Figure 4b displays the LTVs that produce the largest increase in the pool of eligible families, i.e. those that are more effective in enlarging the market for mortgages (the blue dots). These LTVs are compared with the actual average ratios applied by Italian banks in 2006-2012 (the red dots). While before the Lehman crisis (i.e. in 2006) average Italian LTVs stayed above the point of maximum slope of the curve, this was not the case afterwards, and by 2012 the gap had widened to 17 percentage points: the more restrictive standards adopted by lenders brought average LTVs towards levels where there was still room for sizeable gains in the pool of eligible borrowers. Of course, average LTVs did not exclude that larger shares of the dwellings might be financed by banks, both in the year before and after the crisis. Nevertheless, Figure 4b suggests that Italian banks, which before the crisis offered average LTVs virtually at levels which would have maximised the gain in the share of eligible households, ensuring the sustainability of mortgages, adopted a more

conservative approach to homebuyers' leveraging in subsequent years. This confirms the evidence from other markets, i.e. that lower LTVs during this period were mainly supply driven, whereas households' preferences had barely changed (Kuvshinov, 2011).

6 Access to housing mortgages for heterogeneous households

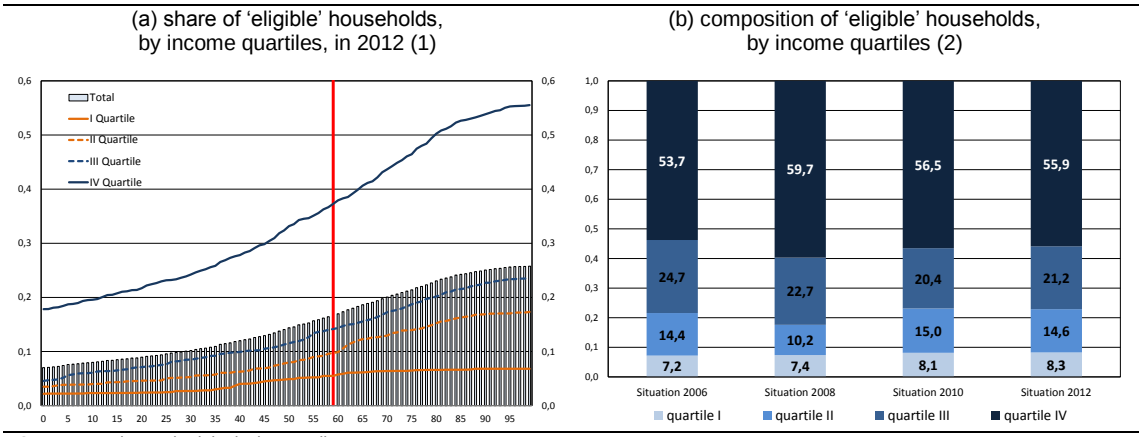
6.1 Households with different incomes

Disposable income is by far the most important factor driving the ability of a family to qualify for a mortgage. In Figure 5a, mortgage eligibility at different LTVs is plotted for the whole sample and for each income quartile, with reference to year 2012. Although the increase in LTV is effective in enlarging the pool of potential borrowers in every income quartile, the impact is highly heterogeneous: the slope of the curve increases with income, suggesting that higher LTVs are more important for high-income households. For example, moving from a 59 per cent LTV (the actual average in 2012, the red line in the chart) to a 90 per cent LTV would have increased the share of eligible households by 0.6 percentage points for the lowest incomes (first quartile), compared to a 4.1 percentage point increase for the wealthiest families. However, this is true in *absolute terms*, while the picture is slightly different if one looks at the *relative* enlargement of the pool of borrowers, i.e. taking into account the heterogeneous starting levels: in relative terms it is confirmed that low-income families benefit less from higher LTVs, but middle-income families experience the largest relative increase in the share of eligible borrowers.

Figure 5

Access to sustainable housing mortgages at different LTVs, by income quartile (1)

(percentage values)



Source: see the methodological appendix.
(1) The chart displays the share of households with access to sustainable mortgages (i.e. households that could cover the initial payment with their wealth (excluding their own home's value) and whose repayment burden was below 30 per cent of income), by income quartile. – (2) The chart displays the percentage composition of households with access to sustainable mortgages, by income quartile.

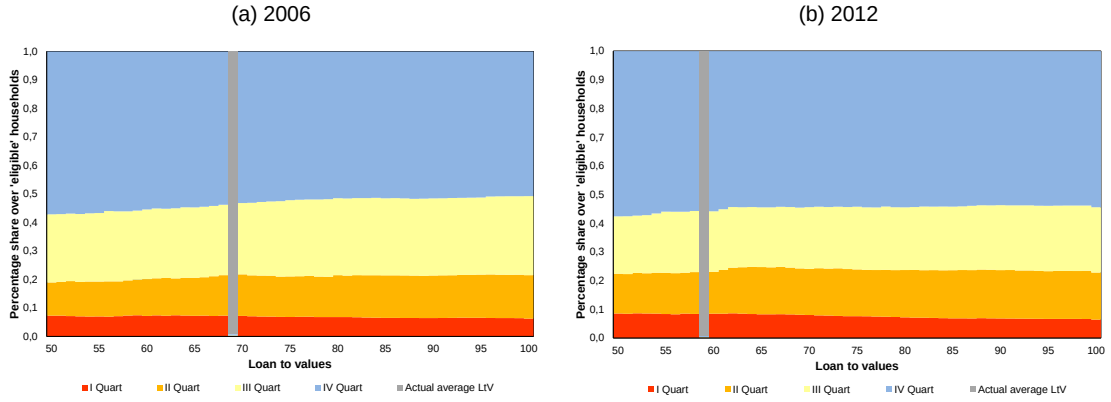
This is confirmed by Figure 5b, displaying the composition of eligible families by quartiles of income taking into account the actual market conditions in the four years of the SHIW within our reference period (2006, 2008, 2010 and 2012). While the share of the lowest and highest income families overall displayed the main increases between the first and last year of the period (1.1 and 2.2 percentage points for the first and fourth quartile, in that order), the share of middle-low incomes was unchanged and that of middle-high incomes (the third quartile) shrank by 3.5 percentage points, confirming that declining LTVs harmed middle incomes the most.

Moreover, figure 6 suggests that the relative benefit of high LTVs for middle-income households (the yellow and orange areas) is sensitive to the other mortgage conditions prevailing in the market, and stronger in 2006 than in 2012.

Figure 6

Change in composition of households eligible for a mortgage with different LTVs (1)

(per cent)



Source: see the methodological appendix.
(1) The chart displays the percentage composition of households eligible for mortgages at different loan-to-values and for the different income quartiles (summing at 100 per cent). The vertical line shows the actual average LTVs prevailing on the Italian market in the reference year.

Table a1 in the appendix shows the percentage of households for which mortgaging a house was difficult taking into account the supply conditions prevailing in 2006-2012. For all the income classes the main driver of exclusion from financing homeownership is the budget constraint: the percentage of families without sufficient endowments to down-pay the required amount is systematically higher than those who would have to devote more than 30 per cent of their income to debt repayment, in particular for lower incomes. In 2012, for almost all the households for which access to mortgages was problematic, this condition stemmed only or in part from the budget constraint; this was the case across all the income classes. However, it is remarkable, again, that the worsening of Italian households' situation between 2006 and 2012 was stronger at the medium levels of income, and in particular for the third quartile: the share of middle class families potentially excluded from the market for mortgages rose by over five percentage points across the period, more than for any other income class.

6.2 Access to housing mortgages for households with heterogeneous socio-economic characteristics

In addition to income, several socio-demographic characteristics are important for households' capacity to access homeownership, such as professional status (self-employed or salaried employees, retired workers, the jobless), age, education and citizenship of the mortgagor, the size and location of the family. For instance, younger families might have a different propensity to save than their elder counterparts, even for comparable income levels, and this might affect their ability to pour equity into dwellings. Furthermore, younger families tend to be those most in need of smoothing their financial capability over the life cycle, swapping their future income expectations against current liquidity; they might be therefore more severely affected by strict LTVs applied by the lenders (Kuvshinov, 2011; Ortalo-Magné and Rady, 2006).

Table a2 allows the disentangling of the household classes that face difficulties most frequently in accessing a mortgage-based home purchase.

Most of the families *de facto* excluded from the mortgage market at the conditions prevailing in 2006-2012 were ones in which the mortgagor was employed or retired, whereas self-employed people experienced greater ease of access to mortgages. Less than one tenth of households other than owner-occupiers could afford to initiate or sustain a mortgage for a standard apartment (against one fifth for owner-occupiers in 2012): in other words, mortgage capability was the lowest precisely for those people who were more likely to need to apply for a loan to become a homebuyer. However, between 2006 and 2012 the drop in the share of families with access to sustainable mortgages was sharper for home owners. Access to housing loans rose with the age of the reference person, although this displayed a non-monotonic pattern, and decreased again for the oldest class of people.

The overstatement of mortgage affordability stemming from neglecting down payments differs from household to household. It is particularly large when the head of household is employed, middle-aged, or relatively highly educated. Access to housing mortgages also appears grossly overrated for larger families, if based on the mere repayment burden. Although between 2006 and 2012 virtually no segment of Italian households recorded an improvement in its ability to mortgage a house, the worsening was particularly marked for those whose budget constraint was initially less binding (the self-employed, owners, educated people).

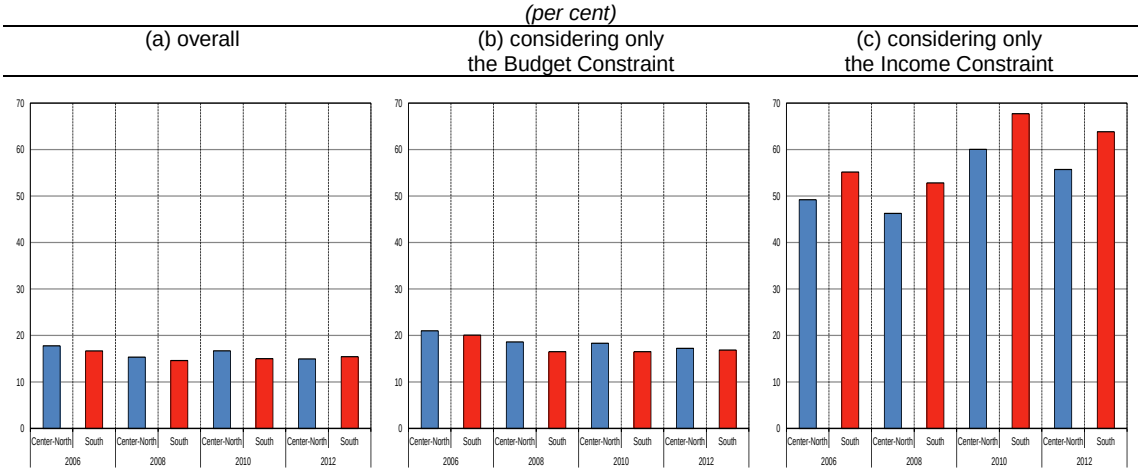
6.3 Access to housing mortgages in different areas

Geographical aspects are relevant for real estate markets, which tend to be highly segmented, especially in Italy, featuring a persistent and pervasive divide between the Centre-North and the South (OMI, 2013).[9]

Figure 7

Percentage of households with access to sustainable mortgages by country area (1)

(per cent)



Source: see the methodological appendix.
(1) Households are deemed to have access to sustainable mortgages for a standard apartment if they can afford the down payment by using their wealth, net of their first residential homes' value (panel b) or the periodic repayment of the mortgage is below 30 per cent of the household's income (panel c) or both (panel a).

[9] We note that in evaluating mortgage accessibility for a standard apartment, we take into consideration the region (NUTS2 level) and the degree of urbanization of the area where the household is located; see the methodological appendix for further details.

In both areas of the country the share of families with access to mortgages decreased over the period but the deterioration was stronger in the Centre and North, especially after 2010 (Figure 7a). As a consequence, the share of eligible families was basically the same in the two areas in 2012, though smaller in the South in 2006, in spite of comparatively lower house prices. In both areas the overall share of eligible families was increasingly driven by the down-payment side (Figure 7b); by contrast, the share of families excluded from the market because of the burden of periodic repayments declined over the period (as lower house prices, lower interest rates and lower LTVs offset lower incomes; Figure 7c). When the budget constraint is not accounted for, southern households apparently have broader access to homeownership through mortgages. Figure 7c is therefore somehow at odds with real-world data, as the participation of families in the mortgage market happens to be relatively low in the southern regions (Vacca et al., 2013). As a consequence, taking into account both the repayment and the down payment, the real data are better fitted than with the usual repayment-based analysis.

All in all, explicitly considering the budget constraint along with the income constraint changes to some extent the map of the real capability of Italian families to mortgage their dwellings: the situation in the Centre and North appears better off compared to other areas, whereas access to housing mortgages appears more difficult for families from some southern regions.

7 Wealth, intergenerational transfers, disadvantaged households

7.1 Alternative notions of household wealth

A key driver of the results we find is the definition of wealth employed to assess the ability of households to make the initial payment required by the lending bank. Given our definition of wealth, *inherited* prosperity and gifts from relatives might be crucial to improve the ability of a household to qualify for a mortgage (Engelhardt and Mayer, 1996; Chiuri and Jappelli, 2003).

In order to disentangle the impact of legacy wealth on mortgage affordability, we amend the benchmark framework in two ways.

First, we re-run our estimations for the subsample of non-homeowners: we thus disregard the main asset a family could receive as a legacy and at the same time we focus on the group of households which could be more interested in taking out a mortgage. The results (not reported) confirm the findings of the benchmark simulation in terms of both the shape and shift of the 'mortgage affordability curve' between 2006 and 2012; the percentage of the eligible families within this segment is systematically lower than that within the full sample.

Second, we introduce an alternative notion of resources available to a household which emphasizes the *current* saving capability of the potential borrower. Under this alternative definition, the initial payment can be deemed affordable if it can be fulfilled through a reasonable accumulation of own resources, by means of savings. This approach focuses on the income and savings of the homebuyer, regardless of assets which might be the legacy of the family of origin, and therefore it disentangles current mortgage affordability.[10] An explicit link between down payments and the

[10] Within this framework, we use the *current* saving ability in order to gauge the liquidity accumulated by homebuyers in the years *before* the decision to purchase a house, which is a reasonable assumption if the number of years hypothesised to accumulate savings is relatively small.

propensity to save is established in the extant literature. For example, according to Balta and Ruscher (2011): *"when banks only accept to cover part of the full value of the housing investment, first-time buyers or existing owners wishing to acquire a more expensive house have to save in order to accumulate the capital required to cover the down payment"*. This relationship, which is obvious for first time buyers, is also consistent with the 'accidental landlords' phenomenon, i.e. existing owners who keep their previous home and rent it out instead of selling it when moving up the housing ladder (Carozzi, 2014).

This definition of wealth – alternative to W_1 (see Section 3) – yields $W_2 = nS$, where n is a number of years of saving that can be deemed reasonable. Although no straightforward benchmark is available for such a period on the Italian market, we assume a five-year period as a reference and therefore n=5 (see the methodological appendix).

Figure 8 compares the 'mortgage affordability curves' for the two alternative notions of wealth for the years 2006 and 2012. According to Figure 8, both the level and slope of the curve are affected by the notion of wealth. We first note that the level of the curve is higher under the W_2 hypothesis for most LTVs, an outcome which is affected by the value of n.[11] The main differences between panel (a) and (b) of Figure 8 are the slope of the curves and their evolution between 2006 and 2012. The curves based on saving capability are steeper, suggesting that LTVs are a more important bottleneck when only the accumulation of original wealth is taken into account and inherited prosperity is disregarded. By the same token, more generous LTVs have a larger impact under this wealth definition, and possible caps would constrain the pool of eligible mortgagors to a larger extent than when traditional wealth definitions are employed.

Figure 8b confirms that the slope of the curve was reduced by the crisis, thus lessening the impact of higher LTVs on the access of Italian families to mortgages. However, unlike what we find using the traditional wealth definition, the 2012 accessibility curve lies systematically below the 2006 curve: after the crisis the pool of eligible mortgagors was therefore smaller under every LTV hypothesis. This was the outcome of the drop in Italian families' incomes between 2006 and 2012, which in Figure 8b also affects the new, saving-related definition of resources available for the initial payment.

These differences lead to a larger loss of eligible families during the crisis when their saving capability is considered and, with respect to the traditional wealth hypothesis, when eligible families are gauged at actual average mortgage conditions in the two years (the red and blue dots in Figure 8). In Figure 8a (traditional wealth) the reduction due to lower actual LTVs is partly offset by an upward translation of the curve during the crisis; by contrast, in Figure 8b (saving ability), the effect of lower LTVs is exacerbated by the downward translation of the curve.

All in all, the exercise suggests that the evaluation of both the effect of the crisis on access to mortgages and the consequences of caps on LTVs are greatly affected by the definition of family resources, i.e. by the weight given to the saving capability rather than to more traditional notions of accumulated assets.

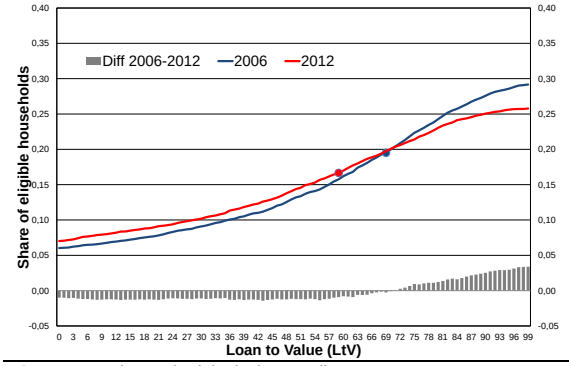
[11] Estimations with alternative values of n, not displayed, yield the same results in terms of the shape and shift of the curves, although with different absolute levels.

Figure 8

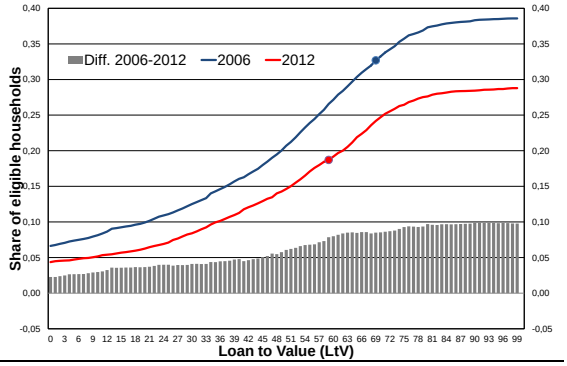
Access to mortgaging a house for different loan-to-values and definitions of wealth (1)

(percentage of families with access to sustainable mortgages; 2006 and 2012)

(a) wealth = real and net financial assets (ex home) (W_1)



(b) wealth = saving ability (W_2)



Source: see the methodological appendix.

(1) The lines display the share of Italian families eligible for a mortgage, under the hypothesis of different loan-to-value percentages; the bars display the difference in the share of families at the market conditions prevailing in 2006 and 2012. The dots display the share of eligible families at average actual LTVs applied by Italian banks, according to the answers of Italian banks to the *RBLS* survey of the Bank of Italy in 2006 (blue dots) and 2012 (red dots).

7.2 Disadvantaged families and the role of gifts

In this section we focus on the households that are more likely to be financially constrained in accessing and sustaining a mortgage. We first consider lower-revenue families, assuming that they are more likely to be subject to financial distress. Second, we devote specific attention to renters, i.e. to families other than owner-occupiers, as the former are more likely to be urged to take out a mortgage. Finally, we take into account the possible role of intergenerational transfers, and especially of parental gifts, in relation to potential homebuyers. The existing literature emphasizes the role of the relatives' wealth in easing financial constraints (see Guiso et al., 1994 for Italy; Engelhardt and Mayer, 1996 for the US). Our data allow us to gauge the availability of parental gifts through a question included in the 2012 wave of the SHIW (see the methodological appendix). Moreover, the role of inherited prosperity has already been implicitly tackled above, through alternative definitions of wealth.

Table a4 describes housing mortgage affordability in 2012 (and in 2006, whenever available) for families according to the disadvantages of their situation. We already noted the much lower access to a mortgage by lower-income households, and that the share of renters eligible for a mortgage is about 12 percentage points lower than for owner-occupiers. Families whose relatives were not affluent, and therefore were unlikely to receive help from them to overcome financial constraints, had a low probability of entering and sustaining a mortgage: almost 91 per cent of these households were excluded from the mortgage market (about 11 percentage points more than other families).

In the last part of Table a4 we combine these possible disadvantages of some Italian households, and finally consider those families earning below-median incomes, living in a non-owned home, and born to non-affluent parents. This segment of households might be more willing, and at the same time more constrained, to enter homeownership through a bank loan.

This exercise shows that a large majority of these families were potentially excluded from the credit market in 2012, with the most discriminating factors being current income and the unlikelihood of relatives providing financial support. For

these families the major bottleneck was by far the initial payment, confirming that potential gifts should not be disregarded in assessing the feasibility of a mortgage for families. Within the subsample of families featuring all the disadvantages (last row of the table), barely more than one out of one hundred could envisage taking out and sustaining a mortgage.

8 Assessing mortgage affordability under different policies

In this section we compare the effects of alternative changes to the baseline situation through policy hypothesis, whose design is inspired by policies which have actually been implemented. In particular, in the U.S. the promotion of home ownership has been a main target since the great depression: in recent years the cost of the assistance programs in terms of interest or down-payment subsidy has increased (Ergungor, 2011), both directly through the AFI (*Assets for Independence*) Act and indirectly, by encouraging savings through the IDA (*Individual Development Account*). From the financial system point of view, LTV limits implemented in many countries after the Lehman crisis (see section 2) can affect accessibility to the mortgage market, although the overall effect depends on the simultaneous use of other tools (as is the case for the *Qualified Residential Mortgage* in the U.S.).

A few caveats are required. First, what follows is a comparative statics exercise: we do not explicitly consider that each modification to the market conditions alters the incentives for market players – banks, homebuyers and sellers – whereas one should employ a dynamic setting (possibly repeated game) to investigate second-round effects. In particular, contributions to home purchase might push real estate prices or interest rates to rise and therefore backfire on housing affordability, with a lower-than-expected final benefit for the homebuyer. Nevertheless, the simulation allows us to assess how actions designed to ease financial constraints work *ceteris paribus*, i.e. holding other conditions constant, which might be reasonable for local and temporary policies. Second, the exercise is not intended to suggest that these modifications to the baseline scenario should be implemented: Italy has a high share of owner-occupier households compared to similar countries (Bank of Italy, 2014), and therefore promoting the rent market could be a more appropriate policy than fostering homeownership, as also suggested by McKinsey (2014) for other markets. At the same time, aids to potential mortgagors have been implemented over time, not only in Italy but also in other countries (Lang and Hurst, 2013) and it is useful to assess how these policies affect targeted segments within the population.

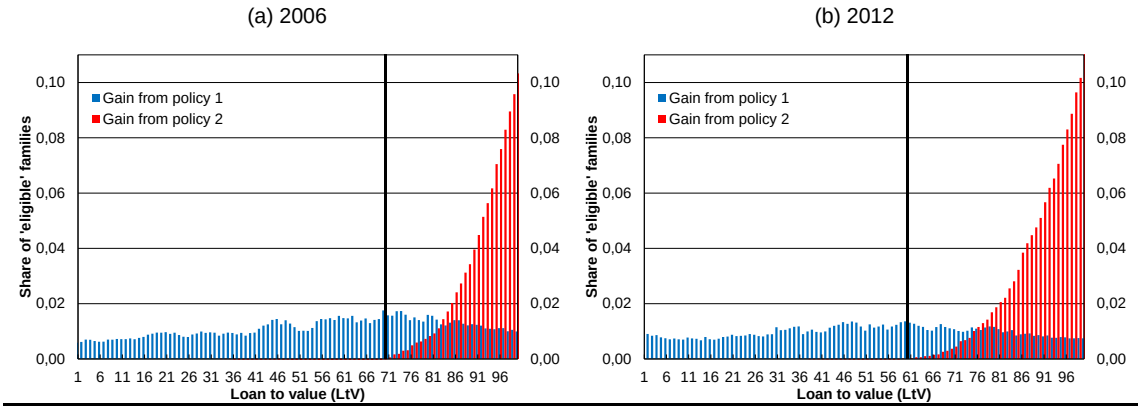
In our example we compare two modifications to the baseline scenario. The first policy lowers the budget constraint, through one-off contributions to house purchase, a kind of lump-sum gift to potential homebuyers. In this case, the repayment burden of the mortgage is unaffected, given the LTV applied by the bank to the borrower. The second action, by contrast, amounts to providing subsidised interest rates for potential debtors (i.e. a discount on the full rate), thus lowering the income constraint, while leaving the budget constraint unaffected. The two hypotheses have been calibrated in order to entail a similar cost (for the policy maker) at the average market conditions in 2006 and 2012.[12] This allows us to compare the two policies in periods with different credit supply conditions.

[12] In particular, in 2006 (2012) we compare a one-off contribution equal to 8.5 (8.0) per cent of the house price (policy 1) and a discount of the full interest rate equal to 25 per cent (policy 2).

Figure 9

Housing mortgage affordability under alternative scenarios (1)

(difference in percentage of households with access to sustainable housing mortgages)



Source: see methodological appendix.

(1) The bars display the difference between the share of Italian households with access to sustainable housing mortgages, under different policies and the "no policy" case. The vertical line shows the actual average loan-to-values prevailing in the Italian market in 2006 (figure a) and 2012 (figure b), according to the *RBLS*.

The main findings from Figure 9 are the following. First, as expected, for every LTV level each intervention delivers a non-lower share of households with easy and access to sustainable mortgages than the baseline case, both in 2006 and 2012. Second, the one-off contribution (scenario 1) is more effective when banks apply low and medium loan-to-value ratios, whereas the interest rate facility (scenario 2) is only effective with higher LTVs. If we focus on the average level of LTVs actually applied by Italian banks (around 69 per cent in 2006, 59 per cent in 2012; Figure 9), the strongest impact, especially in 2006, is ensured by hypothesis 1, while intervention 2 on interest rates is almost ineffective at the credit supply conditions prevailing in those years. Third, there is a remarkable side-effect on the effect of LTVs enlarging the pool of potential borrowers: the one-off contribution delivers a balanced benefit for the whole range of possible LTVs, thus being neutral in providing incentives to borrowers in the choice of their preferred (and sustainable) LTV. By contrast, the subsidised interest rates do not change the pool of eligible debtors at rather low and medium LTVs – where the main bottleneck is the initial payment – and is progressively more effective at high LTVs, with a growing burden for the provider of the subsidy.[13] Therefore, intervention 2 enlarges the pool of borrowers only if the house purchase is highly leveraged (and riskier for banks).

Summing up, apart from considerations about either the cost or the appropriateness of such actions, we find, in line with Lang and Hurst (2013), that granting lump-sum support to potential homebuyers does not affect loan-to-values which maximize the accessibility to the mortgage market, while the opposite is true for discounting interest rates.

In evaluating alternatives, one might also want to assess possible asymmetric effects on families in different socio-economic conditions. As an example, Figure 10 describes the implementation of the two different policies by splitting the outcomes by income quartile in 2012. In particular, Figure 10a plots the difference between the share of potential borrowers with the assistance grant to the house purchase and the same share under the baseline (no policy) scenario, whereas Figure 10b shows the

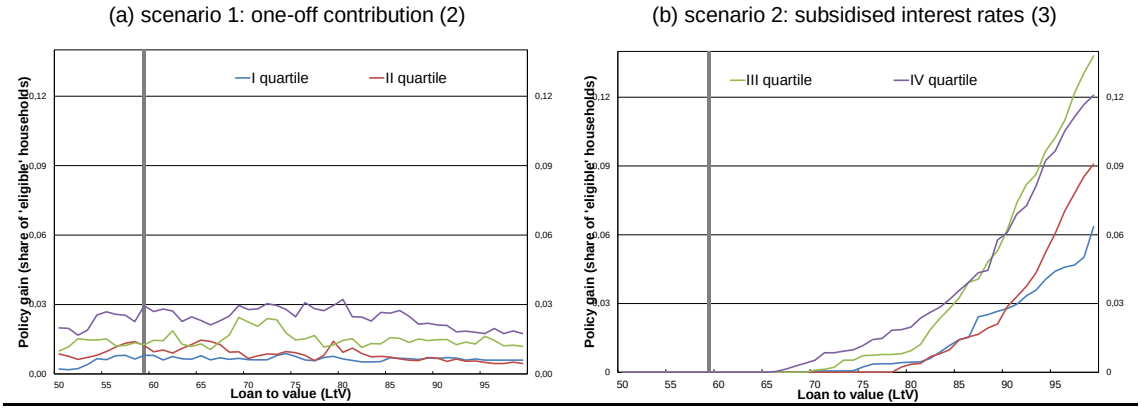
[13] For the reason outlined in the text, the costs of the alternative policies are not perfectly comparable in a dynamic setting: higher LTVs leave the overall cost under scenario 1 unaffected, while they accrue to the overall cost under scenario 2.

outcomes of scenario 2 for the different income quartiles in terms of the difference between the share of potential borrowers with subsidised interest rates and the same share under the baseline scenario. Apart from the size of each effect, both pictures indicate that the benefits are not equally distributed among families belonging to heterogeneous classes in terms of disposable income and that in absolute terms the effect is stronger for higher-income households (number of new families eligible for mortgages). However, the inter-quartile differences are stable at different LTVs under policy 1, whereas they increase with LTVs under policy 2. This confirms that modifications to market conditions should carefully consider a comprehensive notion of access to sustainable housing mortgages, in order to avoid mis-targeting the pool of benefited potential mortgagors.

Figure 10

Housing mortgage affordability under alternative scenarios by income quartile (1)

(percentage of households with access to sustainable housing mortgages; 2012)



Source: see methodological appendix.

(1) The vertical line shows the actual average loan-to-values prevailing in the Italian market in 2012, according to the *RBLS*. – (2) Difference between the share of Italian households with access to sustainable housing mortgages, under policy 1 (one-off contribution = 8 per cent of the house price), and no policy. – (3) Difference between the share of Italian households with access to sustainable housing mortgages, under policy 2 (interest rate subsidy = 75 per cent of the rate), and no policy.

9 Conclusions

Loan-to-values, i.e. the share of a house's worth provided by a mortgage lender, play a pivotal role in driving households' mortgage capability, since high loan-to-values in principle enlarge the potential market for mortgages, but make the debt less sustainable for the borrower and riskier for the lender.

This paper shows that neglecting either of these aspects (the initial payment and the debt repayment) leads to an incorrect assessment of families' ability to mortgage a house. To run the analysis, we employ Italian household-level micro-data for the period 2006-2012, retrieved from the Bank of Italy's survey on households' income and wealth (SHIW). The main results are as follows.

First, joint consideration of both the mortgage repayment and the down payment indexes shows that the improvement in mortgage sustainability recorded between 2006 and 2012, driven by the milder income constraint, is partly overstated; the dynamics of these indicators hinge on the change in interest rates more than on the change in LTVs.

Second, we employ the 'mortgage affordability curve' to gauge the impact of macroprudential policies (e.g. caps on LTVs) on the share of families who can access

and sustain a mortgage at different LTVs. We find that both the level and the shape of the curve change over time and are affected by the definition of households' wealth: therefore the effect of policies should be assessed fully taking into account the actual conditions prevailing on the market and the underlying hypotheses.

Third, the 2008-09 crisis lowered the share of eligible families at high LTVs and increased it slightly at lower LTVs; actual LTVs prevailing in the Italian market gradually drifted away from the level where the eligible families increase the fastest. In other words, as in other countries, declining LTVs in Italy were mainly supply driven, while households' preferences had barely changed. The budget constraint emerges as a major bottleneck for medium-lower income households, youngsters and renters, i.e. precisely those segments which would need to borrow more to buy their own shelter. During the crisis, the situation worsened most markedly for those segments for which the down payment was not a major constraint before the crisis, and in particular for middle-income households.

Fourth, the definition of wealth available to perform the initial payment is key to some of these findings. The intergenerational transmission of assets affects the standard definition of wealth: an alternative definition based on saving capability magnifies the drop in eligible families caused by the crisis.

Finally, a static comparison of different polices which could enhance the pool of potential borrowers suggests that a one-off contribution to the price of the dwellings (a lump-sum gift) is effective over the whole range of loan-to-values, whereas subsidised interest rates become effective in enlarging the pool of potential mortgagors only for very high LTVs. Therefore, a policy maker interested in introducing incentives to safer lending policies should also take into account this side effect of the envisaged interventions. Both these scenarios end up being less effective for medium- or low-income households, i.e. the more financially constrained families: this suggests that other options could be more productive for low-income earners, such as fostering house renting rather than house purchase.

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11 Methodological appendix

To investigate the actual access to housing through mortgages for heterogeneous Italian households in different geographical areas we use annual data over the period 2006-2012 from the following data sources.

The Survey on Household Income and Wealth (SHIW) was started by the Bank of Italy in the 1960s with the aim of gathering data on the income and savings of Italian households. Over the years, the scope of the survey has grown and now includes wealth and other aspects of households' economic and financial behavior such as payment methods. The sample used in the most recent waves (including the 2006-2012 waves) covers about 8,000 households (24,000 individuals), distributed over 300 Italian municipalities. The Bank of Italy regularly publishes summary statistics in its Supplements to the Statistical Bulletin while making the micro-data freely available for research. Data from the Survey on Household Income and Wealth are also disseminated within internationally harmonized datasets.

The Bank of Italy survey on loan interest rates (*SLIR*), covering about 90 per cent of Italian bank loans, makes it possible to gauge the interest rates applied by banks on residential mortgages, with details on variable *vs* fixed rates, regional breakdown, etc.

The Bank of Italy Regional Bank Lending Survey (*RBLS*) collects on an annual basis mortgage features (loan-to-value, duration) from a vast sample of banks, covering over 80 per cent of the credit disbursed to Italian households. Also in this case a geographical breakdown is available. The RBLS is used to retrieve the average durations and loan-to-value of mortgages in different years and regions. The percentage of the house value to be covered by the buyer is set equal to the complement to 100 of the loan-to-value, the share of the dwellings' value covered by the bank's money.

The *Ossservatorio sul Mercato immobiliare* (*OMI*, observatory on the real estate market) enables us to gauge the average house prices at regional level and at half-yearly frequency (Cannari and Faiella, 2007). A 100 sqm apartment is used as a benchmark for a standard house. For the index of real estate prices at country level, we make our calculations y using information that is not available at the regional level, including the new data released by ISTAT from October 2012 (ISTAT). Furthermore we also use other calculations based on municipal data collected by OMI.

In order to implement formulas (1)-(2) in the text and the alternative formula for wealth W_2, the following data have been used, which are available either at regional (Eurostat's NUTS2) or at household level:

Interest rate (r). – Fixed rates on residential mortgages to households with a duration of 10 years and more (Source: *SLIR*, NUTS2 level). The French amortisation method is used to retrieve the periodical outlays related to a given mortgage. Interest rates are allowed to change with different theoretical LTVs applied by the banks. To this end, an LTV-interest rates relationship has been estimated, through an OLS regression. In this econometric analysis, mortgage supply conditions retrieved from several banks on a frequently consulted Italian website providing binding offers for mortgages are explained through the features of the applicant (province of residence, age, working status, income) and a fixed effect for each offering bank. The estimated mark-up on interest rates for given LTV thresholds, as in Titman et al. (2005), is as follows (each mark-up adds to the previous ones): 0.009 if LtV>50; 0.009 if LtV>60; 0.017 if LtV>70; 0.604 if LtV>80; 0.000 if LtV>90.

Duration (T) . – Yearly average mortgage duration (Source: *RBLS*, NUTS2 level).

Income (Y). – Total household's disposable income (Source: SHIW, household level). We use the whole distribution of the total household disposable income to define the income quartiles.

Wealth (W). – Total household's wealth (sum of the real and net financial wealth), excluding the first residential homes' value (Source: SHIW).

Savings (S). – Total household's savings (Source: SHIW).

Price of the house (P) – Average regional and national prices. Annualized half-year data (source: *OMI*, NUTS2 level). Prices have been differentiated according to the degree of urbanisation of the place where the household resides: in particular, a discount of 17 per cent has been applied to households in scarcely crowded areas and a premium of 20 per cent to households from densely populated areas. The discount and the premium have been estimated based on the prices in big towns and in metropolitan areas in Italy in the period 2006-2011, as compared to average real estate prices from OMI.

Loan-to-value (LtV) – Yearly average loan-to-value (Source: *RBLS*, NUTS2 level).

Intergenerational transfers (gifts). – In order to gauge the availability of gifts we use a question available only in the 2012 survey (C46): "In an emergency, do you think your household could temporarily borrow the sum of €5,000 from friends and relatives who do not live with you?" (Source: SHIW, household level).

Saving period. – The wealth definition W_2 to be plugged into the (3) posits that the mortgage is affordable if a typical family can make the cash deposit not covered by the mortgage through savings accumulated in a reasonable period of time (n). Evidence is scant about the typical saving period to allow this initial payment: based on US market evidence, Engelhardt and Mayer (1996) find saving periods of around 3 years, with differences across geographical areas, period of analysis and type of household; Blackwell and Park (2011) assume 3 to 5 years as a fair accumulation period for the UK market. However, the US and the UK evidence stems from a market where it is not rare that banks cover up to 80-90 per cent of the house value, i.e. much higher loan-to-value ratios than usual in other markets. Wang and Wen (2012) estimate a 12-year saving period for some urban areas within China. To the best of our knowledge, no benchmark is available relative to the value for n for Italy. So, for the Italian market we use a benchmark saving period equal to 5 years which is a reasonable time from our point of view (i.e., $n = 5$ in (2)).[14] Section 6 displays to what extent different saving period hypotheses affect the main findings.

[14] Our assumption is closed to the average ratio between the value of the house owned by a family and its yearly income in the period 2006-2012 according to SHIW (around 7 years). This ratio shows how many annuities of gross income are needed to buy a home, and can serve as a benchmark for the fair period through which the income *net* of necessary consumption should cover the value of a house *net* of the mortgage. Table a2bis shows the results on the sustainable mortgage accessibility under different assumptions for n.

12 Statistical appendix

Table a1

Access to sustainable housing mortgages by income quartiles (1)

(percentage of Italian households without access to sustainable housing mortgages, at actual market conditions)

	I Quartile			II Quartile			III Quartile			IV Quartile		
	Due to repayment	Due to down-payment	Overall	Due to repayment	Due to down-payment	Overall	Due to repayment	Due to down-payment	Overall	Due to repayment	Due to down-payment	Overall
2006	80.4	92.9	96.9	62.6	88.1	91.8	38.0	79.8	82.3	14.6	56.4	59.2
2008	81.9	94.4	97.2	65.7	92.2	95.1	43.7	83.6	86.8	15.4	58.0	60.4
2010	68.0	93.7	93.7	47.5	89.6	91.5	27.6	85.5	86.9	7.1	60.2	60.4
2012	75.8	93.6	96.6	49.6	89.4	92.2	32.5	85.8	87.3	8.8	62.8	63.4

Source: see the methodological appendix.

(1) Households are deemed to have access to sustainably mortgaging a standard apartment if one of the following conditions applies: (i) the repayment of the mortgage is below 30 per cent of the household's income (column '*Due to repayment*') or (ii) they can afford the down payment by using their wealth minus, the first residential homes' value (column '*Due to down-payment*'). The column labelled '*Overall*' j takes into account both these requirements (i.e. both conditions must be fulfilled).

Table a2

Access to sustainable housing mortgages by socio-economic characteristics (1)

(percentage of Italian households without access to sustainable housing mortgages, at actual market conditions)

Characteristics	2006			2008			2010			2012		
	Repayment	Down-payment	Overall	Repayment	Down-payment	Overall	Repayment	Down-payment	Overall	Repayment	Down-payment	Overall
Profession. status												
1. Employed	40.8	85.7	87.3	46.6	88.1	88.8	32.6	88.0	88.1	37.0	88.3	88.4
2. Self-employed	29.8	48.0	54.9	32.1	50.5	60.0	21.4	51.4	55.2	28.0	49.6	58.7
3. Other	59.9	81.5	85.3	60.2	84.2	87.2	44.7	84.6	86.8	47.6	85.1	87.2
Tenure												
1. Owners	40.0	74.8	78.3	41.9	77.9	80.8	26.9	77.6	79.4	30.7	78.8	80.7
2. Other (renters…)	68.4	89.1	91.8	73.3	91.2	93.9	60.6	92.2	93.4	64.0	91.3	93.5
Age												
1. Under 35	54.2	89.2	90.1	65.6	92.7	94.8	49.0	92.3	93.7	53.5	89.9	91.3
2. 35-44	45.3	80.2	83.8	49.3	85.6	87.4	38.4	87.2	87.8	45.7	87.4	89.6
3. 45-54	35.9	76.2	79.1	37.7	77.9	80.6	27.4	79.5	81.1	33.8	81.2	82.8
4. 55-64	34.6	71.4	74.4	37.4	72.8	75.9	23.7	72.5	73.9	27.7	76.1	77.6
5. Over 64	64.8	81.8	85.9	64.5	83.7	87.4	47.4	83.3	85.7	47.8	82.8	85.4
Education												
1. Primary or less	69.2	88.3	91.8	71.3	90.7	93.7	54.9	89.4	91.4	59.2	88.4	91.1
2. Secondary	49.2	81.8	85.1	53.3	84.3	87.3	38.9	84.6	86.2	44.8	86.8	89.1
3. High school	34.4	72.0	75.1	38.5	75.5	78.4	28.0	78.3	80.1	30.9	77.0	78.6
4. Graduate, beyond	22.3	60.8	63.6	24.1	66.0	67.6	16.8	68.0	68.2	19.4	72.5	72.8
Citizenship												
1. Italian	48.0	78.8	82.1	49.8	81.1	84.1	35.2	81.3	82.9	38.9	81.7	83.8
2. Non-Italian	79.7	97.9	97.9	86.9	98.5	98.6	73.9	98.0	98.4	79.0	99.2	99.2
Household size												
1. Single	82.9	88.8	93.3	84.6	89.8	94.9	68.5	89.3	92.2	70.6	91.0	93.2
2. Two members	48.7	77.8	81.5	50.4	80.5	83.4	35.5	80.7	82.3	35.6	79.5	82.4
3. Three members	32.9	76.8	78.3	34.2	78.7	80.1	22.6	80.7	81.4	25.6	79.7	80.5
4. Four members	28.6	72.8	76.3	30.1	77.4	78.7	19.1	78.2	79.4	26.7	80.8	82.3
5. Five m. or more	30.7	76.6	78.6	37.5	80.3	82.6	26.6	78.5	79.1	30.5	77.7	79.2

Source: see the methodological appendix.
(1) Households are deemed to have access to sustainably mortgaging a standard apartment if one of the following conditions applies: (i) the repayment of the mortgage is below 30 per cent of the household's income (column '*Due to repayment*') or (ii) they can afford the down-payment by using their wealth net of the first residential homes' value (column '*Due to down-payment*'). The column labelled '*Overall*' takes into account both these requirements (i.e. both conditions must be fulfilled).

Table a3

Access to sustainable housing mortgages by macro-area

(percentage of Italian households without access to sustainable housing mortgages, at actual market conditions) (1)

	Centre-North			South		
	Due to repayment	Due to down-payment	Overall	Due to repayment	Due to down-payment	Overall
2006	50.8	70.0	82.2	44.8	79.9	83.3
2008	53.7	81.4	84.7	47.2	83.5	85.4
2010	40.0	81.7	83.3	32.3	83.5	85.0
2012	44.3	82.8	85.0	36.2	83.1	84.6

Source: see the methodological appendix.
(1) Households are deemed to have access to sustainably mortgaging a standard apartment if (i) the repayment of the mortgage is below 30 per cent of the household's income (column '*Due to repayment*') or (ii) they can afford the down payment by using their wealth, net of the first residential homes' value (column '*Due to down-payment*'). The column labelled '*Overall*' takes into account both these requirements.

Table a4

Disadvantaged families and the role of gifts (2006 and 2012) (1)

(percentage of Italian households without access to sustainable housing mortgages, at actual market conditions)

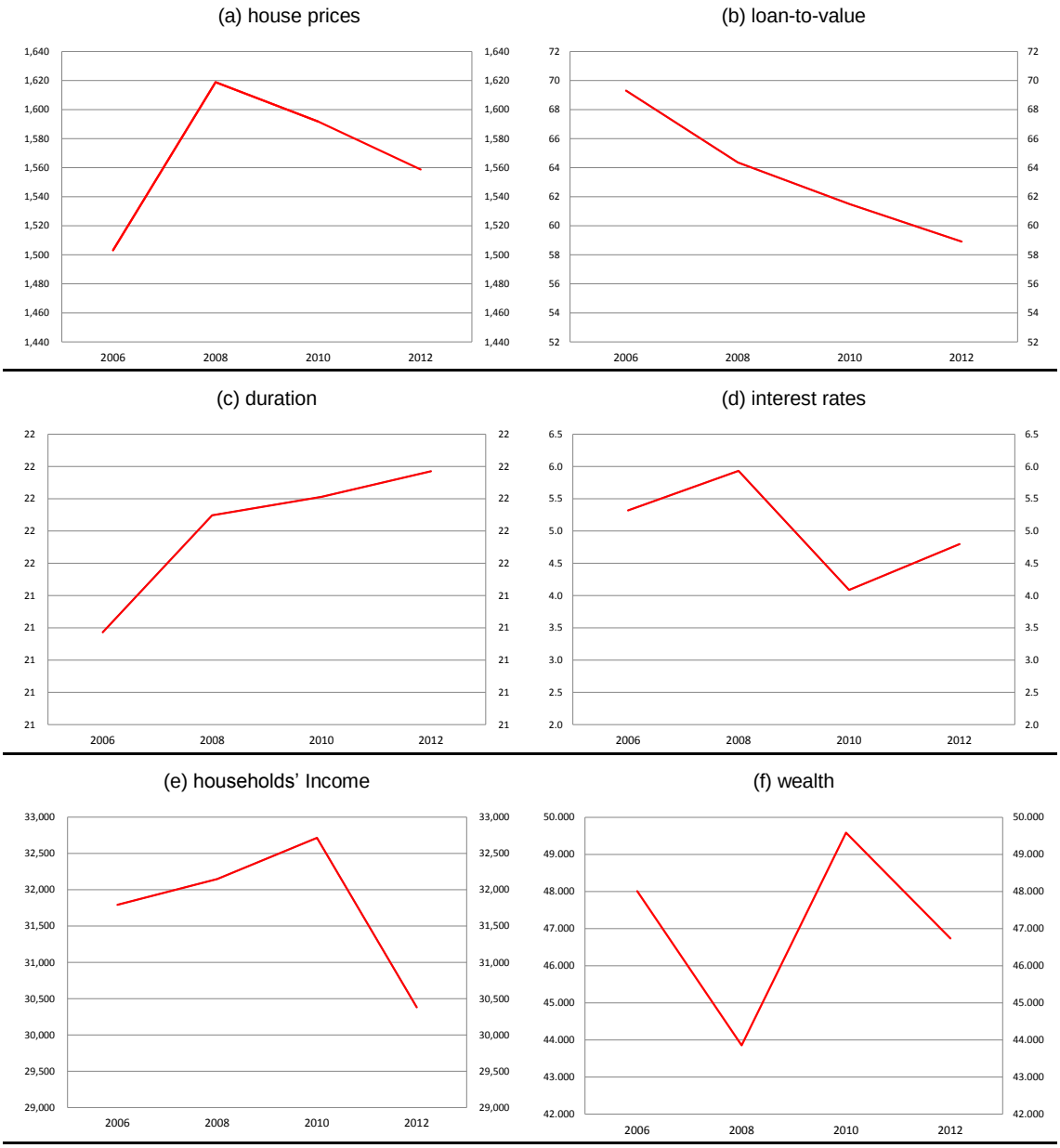
	2006			2012		
	Due to repayment	Due to down-payment	Overall	Due to repayment	Due to down-payment	Overall
Income						
1. First quartile	80.4	92.9	96.9	75.8	93.6	96.6
2. Second quartile	62.6	88.1	91.8	49.6	89.4	92.2
3. Third quartile	38.0	79.8	82.3	32.5	85.8	87.3
4. Fourth quartile	14.6	56.4	59.2	8.8	62.8	63.4
Tenure						
1. Owners	40.0	74.8	78.3	30.7	78.8	80.7
2. Other (renters, …)	68.4	89.1	91.8	64.0	91.3	93.5
Gifts (2)						
1. Possibility of financial help from relatives	n.a.	n.a.	n.a.	34.8	77.5	79.7
2. Impossibility of financial help from relatives	n.a.	n.a.	n.a.	49.7	89.3	91.0
Household with…						
1. … rented house and income below the median value	82.3	94.7	97.5	74.5	94.9	97.4
2. … rented house and no gifts	n.a.	n.a.	n.a.	69.7	94.7	96.5
3. … no gifts and income below the median value	n.a.	n.a.	n.a.	66.9	94.4	96.7
4. … rented house, no gifts and income below the median	n.a.	n.a.	n.a.	76.5	97.0	98.8

Source: see the methodological appendix.
(1) Households are deemed to have access to sustainably mortgaging a standard apartment if (i) the repayment of the mortgage is below 30 per cent of the household's income (column '*Due to repayment*') or (ii) they can afford the down payment by using their wealth, net of the first residential homes' value (column '*Due to down-payment*'). The column labelled '*Overall*' takes into account both these requirements. – (2) The possibility of gifts is gauged through a specific SHIW question (see the methodological appendix).

Figure a1

Changes in the factors underlying housing affordability through a mortgage in Italy (1)

(yearly averages; 2006-2012)



Source: see methodological appendix.