

Macroprudential measures in the housing markets – a note on the empirical literature

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Abstract

Purpose – The global financial crisis has led to increased attention on the relationship of household indebtedness and systemic risks. As a result, macroprudential measures aimed at reducing the risks have been introduced in many countries. The purpose of this paper is to review the recent empirical literature on the measures targeted at households in the housing markets.

Design/methodology/approach – This note reviews and discusses the recent empirical literature on macroprudential measures targeted at households in the housing market as well as housing-related tax policy measures.

Findings – To date, the literature mostly consists of cross-country studies using aggregate data and looking at a large set of different measures. The studies typically report associations between the measures and the outcome variables of interest (often credit growth and house price appreciation), but do not assess the causal effects of the different measures or the underlying mechanisms.

Originality/value – Exploiting household data together with policy reforms should be a useful step forward in understanding the effects of the measures and uncovering the mechanisms through which they operate. This would also allow studying the distributional effects of the measures. Understanding the distributional effects is important in its own right, but it is also required because the ultimate goals of the macroprudential policies are related not only to the aggregate level of credit but also to the distribution of leverage.

Keywords Debt, Financial crisis, Systemic risk, Housing markets, Macroprudential policies, Housing-related tax policies

Paper type Literature review

Introduction

Increased household leverage and the associated dramatic house-price boom in the beginning of the century are widely regarded as having been important in the build-up of the recent financial crisis and subsequent global recession. These experiences have been followed by increased attention on household behavior in the housing market[1]. This note reviews the recent empirical literature on the measures targeted on households in the housing markets.

The general aim of the macroprudential regulation is to reduce systemic risks and to ensure financial stability (Galati and Moessler, 2013; Freixas *et al.*, 2015). In the housing market context, the concrete objectives include reduction of excessive household leverage and mitigation of house price cycles. The rationale of the measures relies on the existence of

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externalities, spillovers and contagion effects between different markets, in particular from the housing market to aggregate consumption.

Reducing the likelihood of a systemic risk need not be the only reason for implementing macroprudential measures in the housing market. This is because excessive household leverage may have adverse aggregate effects even if it does not lead to a financial crisis. When households are highly leveraged and most of their wealth is in the form of housing, a negative house price shock may cause a dramatic decline in household net wealth. This may induce highly leveraged households to reduce consumption sharply. Because of nominal rigidities in the economy, this may result in increased unemployment and recession. This mechanism can be expected to be strong precisely when households do not default on their loans[2]. The evidence, especially from the USA, suggests that it may be strong enough to warrant some careful consideration (Mian and Sufi, 2014).

The recent development regarding macroprudential measures reflects international coordination efforts and national policy choices. As part of the general tendency, also the measures targeted at borrowers have become more common. For instance, 14 EU countries adopted some type of loan-to-value rule between 2010 and 2016[3].

However, at the same time, governments conducted policies which encouraged households to borrow in order to acquire owner-housing. For instance, in most OECD countries, housing enjoys a tax-favored status, mainly because the return to owner-housing, the imputed rental income, usually goes untaxed, while the return to financial assets is typically taxed at a relatively high effective tax rate[4]. The literature studying the effects of the distortions created by such a tax system has shown that reforms abolishing the asymmetric tax treatment would lead to substantial efficiency gains (Gervais, 2002).

Changes in the tax treatment of housing will affect the incentive to borrow and thereby affect household leverage and house prices. In this sense, housing-related tax policy measures also affect the aggregate risks related to excessive borrowing.

Numerous different classifications of macroprudential policies exist in the literature. The one offered by Kuttner and Shim (2016), dividing the measures into supply-side credit policies, demand-side credit policies and housing-related tax policies, is particularly useful for a housing market analysis. This paper begins by briefly discussing the channels through which different demand-side credit measures and housing-related tax measures may influence housing market outcomes. It then studies on the effects of these two types of measures will be discussed. The paper focuses on empirical studies and does not discuss simulation studies. Finally, some conclusions and directions for future research will be offered.

A sketch of the main mechanisms

Kuttner and Shim (2016) used a simple two-period model with housing and non-durable consumption to highlight the effects of different types of demand-side credit policies. The effects of these policies operate through two different channels: first, they have a direct impact on the demand for housing through the decision-making of the borrowing-constrained households; second, they may shape house price expectations and thereby influence the demand for housing among households that are not borrowing-constrained. These measures often include different types of loan-to-value (LTV), debt-service-to-income (DSTI) and debt-to-income (DTI) rules, and sometimes even maturity caps and amortization requirements[5].

The efficiency of these instruments in affecting credit growth is likely dependent on the housing market conditions. In this regard, the main differences between the LTV rules and DSTI (or DTI) rules are the following: an LTV rule allows aggregate credit to increase with

house prices while the DSTI does not. Also, the DSTI rule becomes less binding when interest rates are falling while the LTV does not.

Hence, an LTV rule is likely to be less efficient in affecting aggregate credit growth during a house price boom, while a DSTI rule is likely to be less efficient when mortgage interest rates are falling. In practice, the difference may be more subtle, because house price booms tend to coincide with falling mortgage interest rates. The difference may be more nuanced also because the DSTI rules may rely on interest rates definitions that are not sensitive to falling interest rates[6].

Although both types of measures influence credit growth, they mitigate different types of risks. LTV rules effectively impose a down-payment requirement on households by restricting the size of mortgage relative to the value of the house. DSTI rules, in turn, restrict the size of debt-service payment relative to household income. Therefore, LTV rules prevent buyers without savings from borrowing, improve borrowers' resilience against house price shocks and lead to lower losses on mortgage loans in case of defaults. DSTI rules in turn ensure affordability of mortgage payments in case of income and interest rate shocks and thereby reduce the probability of default.

Most modeling work focuses on the effects of these policies on household leverage and house prices. Theory based on matching and financial frictions in the housing market would suggest that the policies may also affect the housing markets also in other ways. For instance, tightening the LTV rule reduces housing market liquidity and may, therefore, lead to a larger idiosyncratic price dispersion and a longer time-on-the-market (Eerola and Määttänen, 2015). A tighter LTV rule makes the surplus from trading and hence, also house prices, more sensitive to the households' wealth positions. Therefore, changes in LTV rules are likely to influence these housing market outcomes much like an increase in matching frictions would do.

The second set of policies considered in this note is the housing-related tax measures. Tax measures that have been proposed as macroprudential tools include property, capital gains and transaction taxes, as well as the mortgage interest deductibility rules.

The important difference between the tax policy measures and the demand-side credit measures is that the former operate through changing the relative prices, while the latter operate through directly limiting the ability of certain types of households to borrow. By affecting the user cost of housing, taxes influence demand for credit from all types of households, regardless of whether the borrowing constraints are binding or not.

Another difference between housing-related tax measures and macroprudential measures is that the tax measures are typically evaluated and designed as part of the overall tax system. For instance, the main argument in favor of mortgage interest deductibility is that it extends the non-taxation of the imputed rental income also to households financing their owner-housing with a mortgage (Gervais, 2002). If mortgage interest payments are not fully tax deductible, the user-cost of owner-housing is higher for those financing their housing at least partly with a mortgage. This "tax penalty" can be expected to induce households to move from debt-financing toward equity-financing.

More generally, under a neutral tax treatment of housing and other assets, given current tax treatment of the return to financial assets, the imputed rental income from owner-housing and capital gains would be fully taxed and mortgage interest payments would be fully tax deductible. In reality, a typical tax system does not tax imputed rental income and capital gains. Hence, although the tax treatment of housing and the institutional characteristics of mortgage and housing markets vary considerably across countries, the general rule is an asymmetric tax treatment of housing wealth and other forms of wealth.

Both sets of measures affect the demand for housing. The local housing market conditions ultimately determine whether the market adjusts to the demand shock through prices or supply. Especially in areas where housing supply is highly inelastic because of regulation or other supply constraints, one would expect changes in borrowing to capitalize into house prices. With more elastic supply, house prices are expected to react less[7]. For instance, the adjustment to a negative demand shock could happen through reduced residential construction in growing cities and through price reductions in stagnating housing market areas.

Demand-side credit measures

Most studies looking into the effects of the demand-side credit measures do it as part of a broader setting where several different types of measures are studied across different countries. All studies discussed below considered LTV and DTI rules. While interpreting the results, caution is warranted as both categories include a wide range of different types of measures.

Cerutti et al. (2017) used a recent survey on the use of macroprudential policies in 119 countries for the time period of 2000-2013[8]. Their analysis covered 12 different measures. In the data, LTV rules seem most prevalent in advanced countries, especially toward the end of the study period, while the DTI rules are also used in emerging countries. The developing countries, in turn, seem to rely mostly on other measures.

In the panel regressions, each measure was included as a dummy variable coded as 1 for the entire time period it was used and 0 otherwise. When looking at advanced, emerging and developing countries separately, the authors found no association between the LTV and DTI rules and the overall credit growth in the advanced countries. However, DTI rules were seen to be associated with a reduction in household credit growth. In contrast, there was no indication that the two measures would be related to house-price growth.

Vandenbussche et al. (2015) focused on Central, Eastern and Southeastern Europe (all together 16 countries) and constructed a quarterly database of 29 different macroprudential measures from different sources, covering the time period from the late 1990s or early 2000s to the end of 2010. Out of the 29 measures, 4 were targeted toward borrowers: LTV and DTI rules which apply regardless of currency denomination and LTV and DTI rules which apply to foreign currency loans only.

Unlike in the other studies discussed, the focus in this study was exclusively on house-price growth. In addition, instead of using dummy variables for policy actions for each quarter, the authors constructed different types of indices capturing the stringency of the implemented changes.

The LTV and DTI rules were implemented only in a handful of cases in the sample. Nevertheless, in some specifications, the overall DTI rules were followed by reduction in house-price growth in the second quarter after the implementation. The changes in LTV rules were not significant in any of the regressions.

Kuttner and Shim (2016) used data on macroprudential measures collected from various sources, mostly official documents of central banks, regulatory authorities and ministries. The data contained 57 countries and ranged from the beginning of the 1980's until the second quarter of 2012. The measures in the data included not only macroprudential measures but also housing-related tax measures. The authors divided the actions into tightening and loosening measures and used the data to create monthly variables, taking value 1 for a tightening, 0 for no action and -1 for a loosening, and summed up the monthly observations to compile a quarterly data set.

Of the over 1,000 different policy actions in the data set, 94 concerned LTV rules and 45 DSTI rules. These measures were most actively used in Asia-Pacific countries (86 times) and in European countries (53 times), and they became more common toward the end of the time period under study[9].

The main outcomes of interest were the aggregate housing credit and house prices. The authors found that DSTI rules were more consistently associated with declines in credit growth than LTV rules. The reason may be that both measures are often implemented during housing booms. If an LTV rule is implemented when house prices are increasing rapidly, rising prices allow more to be borrowed, partially offsetting the tightening of the LTV ratio. The results were much weaker for house prices and the coefficients on both LTV and DSTI rules tended to be insignificant.

Claessens *et al.* (2013) used annual data from the IMF survey for country authorities, covering 48 countries and the time period from 2000 until 2010[10]. Unlike the studies discussed above that studied aggregate credit growth and house prices, Claessens *et al.* studied individual banks. The authors used a panel data of individual bank balance sheets and focused on three different bank-level risk variables – leverage, assets and noncore-to-core liabilities ratio[11].

During the time period of the study, the LTV rule was being used in 24 countries while the DTI rule was being used in seven countries. The use of the various measures was included as a dummy variable in the panel regressions, taking value 1 for all the years the measure was used in the country and 0 otherwise. The regressions also included bank characteristics and the country's macroeconomic conditions as controls.

According to the results, implementation of LTV and DTI rules was followed by a reduction in the growth rate of all three risk variables. Based on the results, it would seem that directly addressing the demand for credit is efficient in reducing the growth of credit. The results were less conclusive about house prices. The authors also conjectured that macroprudential policies aimed directly at borrowers might be less likely to be circumvented than policies aimed at banks.

Both Claessens *et al.* (2013) and Cerutti *et al.* (2017) found evidence of asymmetric effects. That is, the LTV and DTI rules tend to be more consistently associated with risk reductions during boom periods than during busts. In fact, it seems that the measures can be harmful in downturns and can make adjustment more difficult.

All in all, especially DTI rules seem to be associated with slower credit growth. The results concerning house-price growth are much weaker. There may be several explanations for this observation, ranging from endogeneity problems to circumvention of the measures. Circumvention could show up as credit expansion in less-regulated financial institutions or foreign banks or as manipulation of the rules. For instance, a DTI rule could be manipulated by extending sequential loans and reporting the associated debt-to-income ratios separately[12].

Cross-country studies using aggregate data cannot determine the causal effects of the different measures or explore the underlying mechanisms. Studying the effects on individual banks mitigates the problems related to endogeneity, as the implementation of macroprudential policies is less likely to be driven by the performance of individual banks, but this may not solve the issue. Cross-country studies are nevertheless useful while building early warning indicators relying on correlations between the important variables. In addition, they can be useful in determining whether the measures are being efficiently implemented or whether they are somehow being circumvented. These types of issues are likely to become more important, for instance, with the development of different forms of peer-to-peer lending.

Housing-related tax changes

The key challenge for empirical studies on transaction taxes, mortgage interest deductibility and capital gains taxation is the absence of exogenous variation in the tax rates. Most tax policies feature very few changes over time. In addition, when reforms are implemented, implementation typically happens at a national level so that all households are affected in the same manner. However, there exist some studies that relied on reforms which created exogenous variation in the tax treatment, or exploited different types of discontinuities in the tax schedules.

On the subject of real estate transaction taxes, [Best and Kleven \(2016\)](#) studied the UK Stamp Duty Land Tax. The authors exploited discrete jumps in tax liability at certain cutoff prices [13]. They also studied the effects of a temporary transaction tax cut in 2008-2009. The results indicated that transaction taxes are highly distortionary, causing large responses in the price, volume and timing of transactions.

[Kopczuk and Munroe \(2015\)](#), in turn, used the discontinuity in tax liability induced by the so-called mansion tax in the USA. The tax rate is one per cent on the residential transactions of US\$ 1m or more, while transactions of less than US\$ 1m are subject to no tax. The authors found that the tax distorts the price distribution and leads to significant bunching just below the threshold. The results also suggested that the impact of the tax is not limited to the proximity of the threshold, but extends much further, which indicates that the search and matching process is affected everywhere by the tax.

Finally, [Dachis et al. \(2012\)](#) exploited a reform where Land Transfer Tax was imposed in the city of Toronto in early 2008. The authors estimated the effect of the tax by comparing the changes in the Greater Toronto real estate market and the city of Toronto, before and after the imposition of the tax. According to the results, the 1.1 per cent tax caused a 15 per cent decline in the number of sales and a decline in housing prices about equal to the tax.

Apparently, there is no evidence on the relationship between the level of transaction taxation and house-price volatility. It is possible that transaction taxes reduce house-price volatility by reducing speculative trading. On the other hand, the presence of large transaction costs can also work in the opposite direction. High transaction costs may limit the use of arbitrage possibilities and thereby increase price volatility. In addition, by increasing the cost of upgrading, they create an incentive to buy bigger houses and may thereby increase the leverage of young households.

As regards the mortgage interest deductibility (MID), the important feature is that by lowering the user cost of owner-housing, the MID makes acquiring owner-housing by borrowing more attractive. Depending on the local housing market conditions, increased borrowing for owner-housing may, in turn, lead to higher house prices. For instance, [Hilber and Turner \(2014\)](#) showed that mortgage interest deductibility tends to capitalize into house prices in highly regulated housing market areas where supply of housing is inelastic. Only in markets with lax land use regulation does the MID have a positive impact on home-ownership rates. Even in these areas, the positive effect is restricted to higher-income households.

There are several studies directly assessing how MID affects household borrowing. The rules of deductibility have been changed in several countries during recent decades and sometimes, in a manner that can be exploited for identifying the effects of the policy. For instance, in Finland, before the 1993 tax reform, the mortgage interest was deductible according to a progressive income tax schedule. After the reform, the deduction was made according to a flat schedule. Hence, the reform reduced the incentives to use mortgage financing for high-income households and increased the incentives for low-income households. Similar reforms have taken place in Norway and Italy. [Saarimaa](#)

(2010) and Fjaerli (2004) found that in Finland and Norway, high-income households clearly reduced their mortgage-borrowing after the reform, compared to the control group which was unaffected by the reform. Jappelli and Pistaferri (2007) did not find the same for Italy. Here, the authors found support for the hypothesis that changes did not affect credit demand because of the presence of borrowing constraints and lack of financial information about changes in the after-tax interest rate.

The third candidate potentially affecting house-price dynamics is the capital gains tax for owner-housing. This type of tax is likely to influence the housing market in various ways, depending on the details of implementation. With a given house-price development, a capital gains tax with full loss deductibility would reduce the variance of expected capital gains and make investment in owner-housing less risky. In addition, by making the realized losses smaller, it would reduce the cost of moving for a household with negative accrued capital gains. On the other hand, by increasing the cost of moving for those with positive accrued capital gains, the tax may cause lock-in and reduce residential mobility.

Only a few studies have studied empirically the effect of housing capital gains taxation on transaction volume, residential mobility and house prices. For instance, Shan (2011) uses the USA Taxpayer Relief Act, 1997 to study the effect of capital gains taxation on home sales. Prior to the reform, homeowners had to pay capital gains taxes when selling their home, but they could postpone the capital gains in case they bought a new house. After the reform, homeowners could exclude capital gains up to US\$ 500,000 when selling their homes. Using transaction data from Boston metropolitan area, the paper found that the reform increased the transaction volume by reducing the cost of selling the house. The results suggested that housing capital gains taxation has significant lock-in effects on homeowners.

All in all, empirical studies on transaction taxes and capital gains taxes on housing point toward substantial distortions in the housing markets. Given the empirical evidence, it seems that the welfare costs associated with both taxes are too large for them to be suitable measures for managing cyclical variation in the housing market. If tax instruments are to be used for this purpose, it would be less distorting to tax owner-housing directly instead of taxing transactions.

Finally, tax instruments will have redistributive effects, especially if they influence house prices [14]. As a result, implementation will be politically difficult and will, at the very least, require an *ex ante* evaluation. This in itself might make the tax reforms unsuitable as macroprudential measures.

Conclusion and directions for future research

In principle, the rationale behind the macroprudential measures aiming at reducing household leverage is simple: other things being equal, the lower the household leverage, the greater the drop needed in house prices to push the household into negative equity. In addition, if house-price cycles are driven by excessive household borrowing, the measures may help mitigate the cycles.

Hence, in terms of aggregate outcomes, the measures can be useful in two ways. They may help prevent the negative effects of a drastic reduction in private consumption due to a sudden fall in household's net wealth. In addition, they may protect banks from defaults or limit losses given default and, thereby, increase the stability of the banking system.

A complementary approach would be to reduce the incentives to become highly leveraged. When discussing household leverage and the appropriate tools to manage it, paying more attention to the incentives generated by the tax systems might be useful. Both approaches are likely to have direct welfare consequences by changing access to credit, the cost of credit and house prices.

The results on various housing-related tax policies indicate that the incentives to acquire owner-housing are directly relevant for both household leverage and house prices. Empirical research exploiting tax reforms or discontinuities in tax schedules has provided convincing evidence on the causal effects of these tax measures.

To date, the literature on LTV and DTI rules relies much more on cross-country comparisons and does not offer causal evidence on the effects of the policies. There are probably several reasons for this. First, the measures are typically implemented because of alarming housing market conditions, which makes it very difficult to evaluate how the market would have evolved in the absence of the measures. In addition, quite often, several measures are taken in tandem. As different measures may amplify or weaken one another, identifying the effects of any particular measure may be impossible in this setting.

Second, it is difficult to assess the quantitative importance of the measures and even whether they are actually binding or not. For instance, the importance of a new LTV rule depends on whether it actually reduces the opportunities for borrowing or not. In the same manner, whether a change in an LTV rule can be described as a loosening depends on whether the rule was initially binding. Another concern is that lenders assess the credit risk of borrowers using various techniques, even in the absence of any regulatory measures. Implementing a DTI or LTV rule may, therefore, undermine existing practices, which should be taken into account while evaluating the measures.

A tentative summary of the current empirical results would suggest that especially DTI rules are associated with slower credit growth. With regard to house-price growth, the results are much more inconclusive. There may be several explanations for this. One step forward toward being able to discriminate between competing explanations would require looking into the details of the policies and the conditions in which they were implemented, as well as the surrounding institutional setting.

If financial crises caused by housing boom–bust cycles are driven by excessive risk-taking of households having bad incentives, preventing crises requires knowledge of the incentives and the mechanisms through which they operate. Understanding what happens at the household level and why enables tackling the incentives for excessive borrowing.

It would also enable assessing the distributional effects of the macroprudential measures. This is important for two reasons. First, the measures will have distributional effects which merit attention in the same manner as, say, the distributional effects of tax reforms. Second, the systemic risks related to household leverage strongly depend on the distribution of leverage. Therefore, different indicators focusing on the distribution of household indebtedness should be informative for the ultimate goals of the macroprudential policies.

Notes

1. See [Crowe et al. \(2013\)](#) for discussion of the relationship between house price boom-bust periods and financial crises in various countries, as well as the policy options, including monetary policy, fiscal policy and macroprudential policy.
2. Clearly, the relative importance of these risks might depend on whether housing loans are personal loans or limited liability mortgages. For instance, in the USA, households are much less likely to default on their mortgages in states where they are personally liable for the debt ([Ghent and Kudlyak, 2011](#)).
3. Annex 3 in [ESRB \(2015\)](#) gives a detailed description of housing market-related measures in the EU countries and Norway. The description includes the level of LTV, DSTI and DTI rules, exact date of implementation and remarks on the design of the measure. See also [Hartmann \(2015\)](#) for a discussion of housing market related measures in Europe.

4. In addition, owner-housing is typically exempt from capital gains' taxation, mortgage interest payments may be tax deductible and owner-housing may enjoy special status in inheritance taxation.
5. In practice, DSTI and DTI rules are connected through the choice of interest rates in determining the rules.
6. For instance, the DSTI calculation for loans with variable interest rates can use either the interest rate in the loan contract plus a fixed premium or a fixed annual rate, whichever is higher.
7. This mechanism is explored, for instance, by Mian and Sufi (2009) who study the relationship between mortgage credit expansion and house prices.
8. The survey (Global Macroprudential Policy Instruments) was conducted by the IMF in 2013-2014 and includes in total 18 different measures.
9. In the data, the set of LTV rules includes also loan prohibitions and the DSTI rules include other lending criteria like DTI rules. See Shim *et al.* (2013) for more details on the policy actions.
10. A detailed discussion of the data including the description of the different measures taken in different countries and their motivation can be found in Appendix VII in Lim *et al.* (2011).
11. For each country, the authors include up to 100 biggest banks based on total assets. This leads to a sample with roughly 1,700 banks in the advanced countries and 1,200 banks in the emerging countries.
12. See Crowe *et al.* (2013) for more discussion on this issue.
13. For example, the tax rate on the full transaction price jumped from 1 to 3 per cent at a threshold of £250,000 (about \$400,000), creating an increase in tax liability of £5,000 (about \$8,000).
14. The actual macroprudential measures will also have distributional effects, but these effects are less visible and much less discussed in public.

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