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Macroprudential measures and housing markets: A note on the empirical literature



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A note on the empirical literature¹

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Abstract: 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. This note reviews the recent empirical literature on these measures focusing on the housing market. Thus far, 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 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. 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. Focusing on micro-data would also allow studying the distributional effects of the measures. Understanding the distributional effects is important in its own right, but also 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: macroprudential policies, housing markets

JEL Codes: E58, G28

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Introduction

Increased household leverage and the associated dramatic house price boom are widely regarded as having been important in the build-up of the recent financial crisis and subsequent recession in the US and elsewhere. These experiences have been followed by increased attention on the vulnerability of the financial system and experimentation with different macroprudential instruments aiming at limiting the related risks.

The overall aim of macroprudential regulation is to reduce systemic risk. The justification for the various measures relies on the existence of externalities, spillovers and contagion effects between different markets, in particular the negative externalities from the financial sector to the real economy (or from the housing market to the aggregate consumption).³

However, evidence also suggests that excessive household leverage may have detrimental aggregate effects even if it does not lead to a banking 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 lead highly leveraged households to reduce consumption and thereby increase unemployment. This mechanism can be expected to be strong precisely when households do not default on their loans. The recent US evidence suggests that it may be strong enough to warrant some careful consideration (see e.g. Mian and Sufi, 2014).⁴

Of course, making borrowing impossible or very costly always guarantees that households will not suffer from excessive leverage. It is also clear that such extreme policies would entail large welfare costs. Therefore, there will necessarily exist a trade-off between reducing the risks caused by excessive leverage and the positive effects of being able to borrow in order to acquire owner-housing and to smooth consumption over time. Ideally a policy measure should be judged not only by its effectiveness in reducing risks but also by the costs it imposes on households.

The aim of this note is to discuss the recent empirical literature on the macroprudential measures in housing markets. I will focus on the measures targeted on the borrowers. These types of measures have been recently adopted in several European countries (see e.g. Hartmann, 2015 and ESRB, 2015) and include tools such

³ See e.g. Freixas et al. (2015) for a thorough discussion of the different linkages.

⁴ Clearly, the relative importance of these risks might be different in settings where housing loans are personal loans and settings with limited liability mortgages. For instance, Ghent and Kudlyak (2011) estimate that in the US, households are much less likely to default on their mortgages in states where the borrowers are personally liable for the debt (that is, in states with recourse loans).

as maximum limits on loan-to-value ratios (LTV), debt-to-income ratios (DTI) and debt-service-to-income ratios (DSTI).⁵

In addition to these measures, the tax treatment of housing affects not only the cost of credit but also the incentive to borrow. Changes in the taxes on housing will hence affect household leverage and house prices and could be seen as additional measures to be used to limit systemic risks. I therefore also discuss the housing taxation literature when it relates to credit growth and house price dynamics.

I begin by briefly discussing the potential channels through which different borrower based measures could influence housing market outcomes. I will then describe studies focusing on the effects of these measures. Finally, I will discuss some tax related instruments and conclude.

A sketch of the theory

Kuttner and Shim (2013) use a simple two period model with housing and non-durable consumption to highlight the effects of different types of policy measures on credit demand. When analyzing the policies which directly affect credit demand, they focus on maximum DSTI and LTV ratios. The effects of these quantity restrictions 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. They are therefore likely to be important for aggregate outcomes if they apply to a large share of households. Second, they may shape house price expectations and thereby influence the demand for housing also for households that are not borrowing constrained.

In addition, Kuttner and Shim consider different tax instruments. By affecting the user cost of housing, the tax instruments influence credit demand of all types of households regardless of whether the borrowing constraints are likely to be binding or not.

The efficiency of the instruments depends on the state of the housing market. The first difference is that an LTV rule allows credit to increase with house prices while the DSTI rule is immune to house price increases. Second, the DSTI rule becomes less binding when interest rates are declining while the LTV rule is not directly affected by changes in interest rates.

⁵ For a more general classification of measures, see e.g. Claessens et al. (2013). Crowe et al. (2013) offer a thorough general discussion of the measures including monetary policy, fiscal policy and macroprudential policy.

Hence, in principle, a reduction in the maximum LTV ratio is likely to be less efficient than DSTI rule in affecting credit growth during a house price boom, while implementing a maximum DSTI ratio is likely to be less efficient than an LTV rule during a period when mortgage interest rates are falling. In practice, the differences could be more nuanced as the DSTI rules may rely on interest rates definitions that are less sensitive to falling interest rates.⁶

In practice, it will be difficult to compare the effects of different measures as it is not entirely clear in what sense two different measures can be viewed as equally stringent. Moreover, it is possible that when implemented jointly, the different measures amplify or weaken one another. As a result, there should some optimal mix of the different measures.

Regarding other housing market outcomes, theory based on matching and financial frictions in the housing market would suggest that tightening the LTV rule leads to larger idiosyncratic price dispersion and longer time-on-the-market (see, Eerola and Määttä, 2015). The reason is that a tighter LTV rule makes the surplus from trading and hence house prices more sensitive to 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.

Empirical studies on LTV and DTI measures

Country specific studies

Igan and Kang (2011) study the effects of changing the DTI and LTV limits on transaction activity and house price appreciation in Korea. They focus on 13 interventions between 2001 and 2009, ten of which implied a tightening and three a loosening of the credit conditions. Six cases were related to LTV and seven to DTI. The authors use regional level data on housing market outcomes focusing on regions that were subject to policy changes.

According to the results, house price appreciation rates are significantly lower following the tightening of an LTV rule (relative to the average during the sample period). The results also indicate that house price appreciation rates were higher prior to an LTV rule tightening. This may be an anticipation effect, but it can also result from the endogeneity of policy change: if the decision to tighten the LTV rule is based on recent house price development, one would expect the policy change to be

⁶ For instance, in Estonia the DSTI calculation for loans with variable interest rates uses either the interest rate in the loan contract plus two percentage points, or an annual rate of 6%, whichever is higher.

preceded by an increase in prices. DTI rule changes, on the other hand, did not seem to be followed by changes in house price appreciation.

As the policy changes were not exogenous but were instead triggered by changes in the economic conditions, the results cannot be interpreted as causal effects of the policy changes. The authors are aware of this and are cautious in their interpretation of the results.⁷

Krznar and Morsink (2014) study various macroprudential policies regarding housing finance in Canada. The authors begin by providing an overview of the housing finance in Canada focusing on the government's role in mortgage insurance. They then discuss recent changes in the mortgage insurance rules.

Quite a few of the rules were relaxed in the early 2000. Measures included a broadening of the eligible sources of funds for the minimum down payment; increasing the maximum LTV ratio triggering mandatory insurance, and increasing the maximum LTV ratio for any new government backed insured loans to 100% and increasing the maximum amortization period from 25 to 40 years. The authors conjecture that these measures, together with low interest rates, boosted mortgage credit and house prices.

Since 2008, the federal government implemented a set of tightening measures. Some of the measures were reversals of the previous relaxations, others went further.⁸ At the same time, several so-called micro-prudential measures were implemented.

As in Igan and Kang (2011), the authors run an OLS regression with dummy variables indicating the timing of the policy change. They consider separately years 2008, 2010, 2011 and 2012. The outcome variables of interest are mortgage credit growth and house price growth. The dummy variable for 2008 is not significant but the dummy variables for the subsequent years are (2010, 2011 and 2012). However, this empirical strategy doesn't really allow one to assess whether the changes in credit growth were caused by the policy changes. This is because a significant coefficient for the dummy variable does not imply that any particular policy measure caused the change instead of something else that was happening at the same time.

⁷ For instance, they explicitly mention that “Admittedly, the decision to tighten a particular regulation in an area or to change the designation of an area to a speculative zone is not an exogenous one: areas showing signs of overheating are more likely to be subject to a tightening. Moreover, as shown by numerous studies, there generally is a two-way relationship between house prices and mortgage credit as well as between house prices and business cycle movements. Hence, note that it is difficult to tease out the causal effect of LTV and DTI limit adjustments in this setup.”

⁸ Key measures included reducing the maximum amortization periods to 25 years, imposing a 5% minimum down payment; introducing a maximum total debt service ratio of 44%, tightening LTV ratios on refinancing loans and on loans to purchase properties not occupied by the owner and withdrawing government insurance backing on lines of credit secured by homes.

Regarding the evolution of house prices, the authors report a positive association between house price growth and mortgage credit growth. The positive association is reasonable but the causality could run either way. The authors nevertheless interpret the results as showing that changes in mortgage insurance rules caused the changes in house prices *through* the changes in credit growth.⁹

Cross-country evidence

Kuttner and Shim (2013) use a panel of 57 countries, over a period going back to 1980 to study nine different policy measures. The focus is on housing credit and house prices. The authors find that maximum DSTI ratios are more consistently associated with declines in credit growth than LTV ratios. One potential explanation for this result is related to the fact that these measures are often implemented during housing booms. As discussed above, in this situation, rising prices allow more to be borrowed, partially offsetting the tightening of the LTV ratio.

Lim et al. (2011) also consider several different measures using data covering 49 countries from 2000 to 2010. The information on the use of the macroprudential measures is obtained from an IMF survey for country authorities. Credit growth refers to the private sector claims from banks and non-banking financial institutions. The authors document that in more than half of the countries in their sample, credit growth and asset price inflation decline after the implementation of an LTV rule while a DTI rule is followed by a decline in credit growth but not a decline in house price appreciation.

Claessens et al. (2013) study the same policy measures as Lim et al. (2011) but focus on bank risk variables using a panel data of 2300 banks from 35 countries. They find that measures targeted to borrowers (LTV and DTI rules) are likely to be effective, for instance, in reducing the leverage growth of banks. The authors also conjecture that macroprudential policies aimed directly at borrowers might be less likely to be circumvented than policies aimed at banks.

Cerutti et al. (2015) employ a more recent survey on the use of macroprudential policies in 119 countries. Their analysis covers 12 different measures some of which are targeted towards households (DTI and LTV rules). When looking at advanced and emerging countries separately, the authors find that in the advanced countries there is

⁹Krznar and Morsink (2014), page 11: “By reducing mortgage credit growth, the tightening of mortgage insurance rules also dampened house price growth. The estimated equation for house price growth indicates that mortgage credit growth has almost a one-for-one effect on house price growth (Table 5). For example, without the last round of macroprudential measures, the house price growth would have been, on average, higher by about 2.5 percentage point than actually observed since July 2012.”

a weak negative association between some of the borrower based measures and household credit growth but no association between the measures and house prices.

Vandenbusshe et al. (2015) focus on Central, Eastern and Southeastern Europe (16 countries) and construct a database of 29 different macroprudential measures from different sources. They focus exclusively on the question whether macroprudential measures were important for house price inflation during the last decade. The measures include two targeted towards borrowers: maximum LTV and DTI ratios. The outcome variable is the growth of log real house prices and explanatory variables include the 29 macroprudential policies together with other control variables. The model includes country fixed effects and quarterly time dummies.¹⁰ According to the results, four out of the 29 policy variables have a significant coefficient but the LTV and DTI measures do not.¹¹

In general, it seems that implementation of LTV and DTI limits are sometimes associated with slower credit growth and house price appreciation and sometimes not. As the measures may be implemented in different ways and with varying degrees of stringency in different countries and time periods, it is difficult to interpret the contradictory results without further information on the details on the measures and housing market conditions.

Also, a meaningful comparison of the different measures requires assuming that implementing a given DTI limit is an equally stringent measure as lowering the maximum LTV ratio by a certain amount. Therefore, even with more detailed information on how the implementation of the measures, it is not clear how the efficiency of the different types of measures should be compared.

Although cross-country studies using aggregate data on credit growth and house prices cannot identify the causal effects of the different types of policy measures, they are useful when building early warning indicators which rely on correlations between the important variables. In addition, they can be useful in thinking whether the measures are efficiently implemented or whether they are likely to be somehow circumvented.

¹⁰ Other controls include real GDP per capita, domestic and foreign currency interest rate and working age population.

¹¹ The four measures associated with lower house price appreciation are the capital adequacy ratio, maximum ratio of lending to households relative to capital share, marginal reserve requirements related to foreign borrowing and marginal reserve requirements related to credit growth.

Housing-related tax policy changes

Under a neutral tax treatment of housing and other assets, given current tax treatment of the return to financial wealth, imputed rents 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 rents and capital gains. Hence, although the tax treatment of housing as well as the institutional characteristics of mortgage and real estate markets vary considerably across countries, the general rule is an asymmetric tax treatment between housing wealth and other forms of wealth.

Also housing related taxes have been proposed as a measure for influencing household credit growth and house price appreciation. Attention has been paid especially on transaction taxes, mortgage interest deductibility and capital gains taxation.

There is ample evidence that real estate transaction taxes reduce welfare by preventing mutually beneficial trades and thereby reducing household mobility.¹² Recent evidence also points towards the effects being driven by short distance moves, which could suggest that transaction taxes may distort housing markets more than labor markets (see e.g. Hilber and Lyytikäinen, 2015). There is also evidence that transaction taxes capitalize into house prices (see e.g. Dachis et al., 2012).

There is less 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. However, 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.

The deductibility of mortgage interest payments directly affects the user cost of owner housing for households with a mortgage. The rules of the deductibility have been changed in several countries during recent decades and sometimes in a manner that allows for studying the effects on credit growth. 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 in home acquisition 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) find that in Finland and in Norway high income households with

¹² For a comprehensive discussion on the issue, see e.g. IFS (2011), Chapter 16.

high marginal tax rates responded to the reform by clearly reducing their mortgage borrowing compared to the control group which was unaffected by the reform. Jappelli and Pistaferri (2007) do not find the same for Italy. The authors find 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.

Another candidate potentially affecting house price dynamics is the capital gains tax for owner-housing. The mechanism is as follows: Other things equal (that is, with a given house price development), a capital gains tax with full deductibility of losses would reduce the variance of expected capital gains and make investment in owner-housing less risky. In addition, it would reduce the cost of moving for a household with negative accrued capital gains by making the realized losses smaller. But because of these two effects capital gains taxation is likely to influence house price dynamics. For instance, by making it less costly for home-owners to move when house prices are falling, the capital gains taxation would increase supply of housing when prices are falling.

These mechanisms have been addressed in some studies but both theoretical and empirical conclusions seem far from clear-cut. In particular, it does not seem obvious that introducing a capital gains tax on owner-housing would reduce house price fluctuations.¹³

There are obvious difficulties in using these tax instruments in a cyclical way. Although changes in mortgage interest deductibility influence credit growth, using these provisions cyclically does not seem feasible. In addition, creating tax distortions always entails welfare losses. This is especially true for transaction taxes. Given the empirical evidence, it seems clear that the welfare costs associated with real estate transaction taxes are too large for it to be considered a suitable measure for influencing cyclical variation in the housing market. If tax instruments are to be used for this purpose, it would be less distorting to tax 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 a thorough ex ante evaluation. This in itself might make them

¹³ For more discussion on this issue, see e.g. Aregger et al. (2013).

¹⁴ Macroprudential measures will also have distributional effects, but these effects are less visible and much less discussed in public.

unsuitable as macroprudential measures.¹⁵ However, this does not mean that the timing of different tax reforms shouldn't take into account the state of the housing market. An example in the Finnish context would be the phasing out of the mortgage interest deductibility.

Discussion

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

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

In general, macroprudential measures targeted towards households are about limiting leverage in different ways. Another approach would be to reduce the incentives to become highly leveraged. In this respect, 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 price of credit and asset prices.

The macroprudential measures targeted at borrowers aim at limiting the households' ability to borrow. As a result, they will reduce household leverage and in doing so, lead to slower house price appreciation. The real task for the empirical research would be to quantify these effects. In this respect, using aggregate data on credit growth and house prices can answer only a limited set of questions.

If crises are not exogenous but are driven by decision making (excessive risk-taking) of individuals potentially affected by bad incentives, preventing crises requires knowledge of the incentives and the mechanisms through which they operate. Answering these questions reliably requires a research design which enables separating the effects of the measures from everything else that affects credit growth and houses prices.

¹⁵ The timing is of course a crucial issue also for macroprudential instruments. Given the difficulties involved, it is sometimes argued that also the macroprudential measures should be viewed more as structural tools and not as tools that are adjusted according the cycle.

In order to understand what happens at the household level and why, micro-data are needed. The use of micro-data will 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.

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