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Simulating impacts of borrower based macroprudential policies on mortgages and the real estate sector in Austria – evidence from the Household Finance and Consumption Survey 2014[1]

Peter Lindner and Nicolás Albacete,
Central Bank of the Republic of Austria

[1] This paper was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

Simulating the impact of borrower-based macroprudential policies on mortgages and the real estate sector in Austria – evidence from the Household Finance and Consumption Survey 2014

Nicolás Albacete, Peter Lindner[1]

Abstract

In this paper we simulate the impact on house prices and credit available of different macroprudential restrictions on household mortgages in Austria. We apply the methodology developed in the literature for credit register-based information and extend it to the use of survey data. This allows us to make use of the most recent wave of the Household Finance and Consumption Survey (HFCS) in Austria to investigate the linkages between macroprudential policy and credit supply. We find that of the three standard credit ratio-based criteria – loan to value (LTV), debt to income (DTI) and debt service to income (DSTI) – for most households, the income based criteria (DTI followed by DSTI) are the binding ones, while the role of the LTV is limited. The relationship between credit supply and house prices is found to be positive, but weak. We simulate various macroprudential scenarios and find that macroprudential measures may potentially have sizeable effects on the credit available to households for financing real estate. Furthermore, it can be seen that – as expected – macroprudential policy tends to affect less affluent mortgage holders (although at the median, mortgage holders are more affluent than the general household population). The results also show that the simulated macroprudential policy measures trigger smaller changes of house prices.

Keywords: Macroprudential policy, house price development, mortgage market, HFCS

JEL classification: D12, D14, G21, G28, R21, R31

[1] Oesterreichische Nationalbank, Economic Analysis Division, Nicolas.Albacete@oenb.at (Nicolás Albacete) and Peter.Lindner@oenb.at (Peter Lindner). This paper was prepared for the IFC-NBB Workshop on "Data needs and statistics compilation for macroprudential analysis". The original work is published in the Financial Stability Report 33 of the Oesterreichsiche Nationalbank. The views expressed in this paper are exclusively those of the authors and do not necessarily reflect those of the OeNB or the Eurosystem. The authors would like to thank the referee for helpful comments and valuable suggestions.

Contents

Introduction - motivation

Real estate prices as well as household mortgage debt levels increased in Austria. In fact, the strongest increase in residential property prices of the whole euro area was measured in Austria between 2007 and 2016. According to the indices available in the Statistical Data Warehouse, nominal prices rose by 60% between the first quarter in 2007 and the third quarter in 2016, while they stagnated in the rest of the Euro Area. Albacete et al. (2016a) find that strong increases in available house price indices in Austria are likely to be driven by the upper part of the house price distribution. Although, a number of studies have put forward reasons arguing that the mortgage debt of households in Austria are sustainable (see e.g. the analyses in Albacete and Fessler 2010, Albacete et al. 2012, Albacete and Lindner 2013, Albacete et al. 2014, Albacete and Lindner 2015), in October 20106 the European Systemic Risk Board (ESRB) issued an official warning concerning vulnerabilities in the Austrian real estate sector. Following a discussion of real estate developments and debt sustainability, the Financial Market Stability Board (FMSB) in Austria issued a statement particularly focusing on vulnerability indicators of households in Austria.

So far all the analyses in Austria about household mortgage market and vulnerability focused on the identification of potential weaknesses of the sector (e.g. stress testing or the investigations concerning foreign currency loans of households). At least since the official statement of the FMSB in Austria, however, there is a need to assess the potential impact of macroprudential policy measures on households and the real estate market. Macroprudential policy is complementary to monetary policy and can play an important role in limiting the build-up of risks, e.g. in a situation of strong debt-driven house price increases, as, for instance, the Irish experience has shown. Furthermore, macroprudential policies also aim to limit contagion effects in the financial sector and to create the right set of incentives for market participants. Until now there has been a lack of information on the potential impact of macroprudential policy measures. Understanding the role which macroprudential policy could play in limiting the build-up of risks like e.g. strong debt-driven house price increases is an essential task. Thus, this study intends to shed some first light in this direction. As recommended by the ESRB handbook (ESRB, 2014) the paper takes the borrowers perspective. We perform an impact analysis of macroprudential intervention in Austria, setting constraints to the loan to value (LTV), debt to income (DTI) and debt service to income (DSTI) ratio, with a focus on measuring the effects of such interventions on the real estate sector, i.e. mortgage supply and on house prices. We adapt the approach developed by Kelly et al. (2015) and use the best and most recent source of information available, i.e. data from the second wave of Household Finance and Consumption Survey (HFCS 2014) for Austria. The methodology applied in this study basically consists of four main steps: identifying the market conditions, estimating the maximum credit available to consumers, running house price regressions, and simulating various scenarios of macroprudential policy. We find potentially sizeable impacts on credit available whereas the impact on house prices is smaller. Additionally, we are able to identify and discuss the group characteristics of the affected households.

The study underlying this presentation at the IFC-NBB Workshop on "Data needs and statistics compilation for macroprudential analysis" is published in the Financial Stability Report 33 of the Oesterreichsiche Nationalbank (OeNB). The paper can be downloaded (free of charge) from the website of the OeNB and is thus not repeated here again. Instead, this article provides a short overview of the presentation, which

is put into the appendix, and some more details on the analysis. The text refers to the presentation where appropriate. The interested reader is referred to the original work (see Albacete and Lindner, 2017). The article is structured as follows. The next section introduces the methodology followed by the data used for the exercise. Results and their discussion are provided in the main part following the description of the data. Concluding remarks round up the article.

Methodology

We make use of the methodology proposed by Robert Kelly, Fergal McCann and Conor O'Toole (Kelly et al., 2015) from the Central Bank of Ireland. It basically consists of four main steps laid out below. It has to be stressed, that due to data differences (see the section on data below) our approach is not completely identical to Kelly et al. (2015), but we tried to follow the proposed methodology as closely as possible.

Credit available (first two steps)

As a first step we need to identify the prevailing market conditions in Austria. We infer these credit market conditions by studying the distribution of ratios on credit standards at the time of the origination of the mortgage. We consider three ratios: the loan to value (LTV), debt to income (DTI) and debt service to income (DSTI) ratio.

Considering the distribution of these debt burden ratios, it seems obvious that the prevailing market condition with respect to the most extreme values that are financed by the banking sector are given by relatively high percentiles. Although, we do not directly consider the maximum observed value, for the sake of simplicity we refer to these parameters as maximum DTI (DTI_{Max}), maximum LTV (LTV_{Max}), or maximum DSTI ($DSTI_{Max}$) in the remainder of the paper.

Having identified the prevailing market conditions for the maximum ratios banks are willing to provide, it is possible to calculate the amount of credit each individual household might obtain along each channel, i.e. LTV, DTI, DSTI, based on some relevant characteristics of each household (e.g. wealth and income levels).

We can thus compute the maximum credit amount satisfying these constraints, for each borrower household, denoted CA_i in slide 8. Calculating the down-payment available to the borrower and denoting it with $deposit_i$ we calculate the maximum credit along the LTV channel (see slide 8 in the appendix). Based on (initial) income we can calculate the maximum credit over the DTI channel by the second formula in slide 8, stating the product between income and market based maximum DTI. The last channel (see third formula in slide 8) is a bit more complicated since we need to specify the term of the loan in the market, denoted by TERM, as well as the interest rate. Based on a household's income and the prevailing conditions ($DSTI_{Max}$) a maximum repayment per year can be defined, denoted as $RepayMax_i$, which can be used, together with the compound interest formula, to calculate the maximum credit available along this channel. The concrete specifications chosen for the above formulas are outlined in the section on the data. For the complete details, the reader is referred to the paper (Albacete and Lindner, 2017).

Obviously, a bank in the market will consider all three channels together as well as additional information available about the mortgage taker. Here we provide the

channels one by one in order to be clear and transparent. Thus, putting all the channels together and taking the minimum, we are able to estimate the credit available for each household. It is calculated as specified in the last formula in slide 8 in the appendix. The measure of available credit represents the amount of funds the bank (the market) is willing to supply to a household after considering the three credit ratio criteria together. Importantly, it is not the realized amount of credit given to the household. There might be many reasons why a households may be able to purchase the desired property without taking out the entire available credit, e.g. the availability of sufficient funds from other sources.

House price regression and simulation (last two steps)

Once we have computed the amount of credit available at the level of each borrower, we can estimate the relationship between house prices and available credit by performing a regression of houses prices on available credit. We can include borrower characteristics and hedonic characteristics of the house as variables of control in this regression. The matrix X_i (see slide 9 in the appendix) contains an extensive set of real estate and borrower characteristics in order to control for price differences that are due to other factors than the credit available.

For the simulation exercise we look at various different scenarios (see the list in slide 9 in the appendix). First, in line with international efforts and in order to ensure comparability, we look at the impact of each of the three channels separately identified by the market condition. In particular, we look at a 5 percentage point reduction of the prevailing maximum LTV ratio, a 1 year decrease of the prevailing maximum DTI ratio, and a 5 percentage point decrease of the prevailing maximum DSTI. Looking at each channel separately allows us to inspect the impact of each measure. As all three measures are often implemented together and the FMSB also discussed all three policy rates, we additionally combine the three scenarios. For each scenario, we compute a new value of available credit for each borrower by using the method described above. We compare the new value of available credit (offered by the bank [market]) with the observed credit (actually given to the household) to describe the borrowers who have to exit the market due to the new constraint (if available credit is smaller than observed credit and one cannot fully finance the desired demand).

Additionally, we approach the simulation from a different angle (last scenario in the slide). Here we perform a grid search of policy measures that lead to a decrease of average credit available of 30%. In contrast to the assumptions on debt burden indicators this part is more backward looking in the sense that it assumes a particular outcome (decrease of average credit available of 30%) and looks for the policies needed to achieve it. As we are interested in the impact of tighter credit conditions on the market we only investigate a decrease of this figure.

We use this new measure for credit available together with the estimates of the house price equation to simulate the counterfactual house price dynamics under the assumed macroprudential intervention. Hence, while the effect on the price dynamics depends on the house price equation, the change in maximum credit available to households only depends on the observed market conditions.

Data

We use data from the Household Finance and Consumption Survey (HFCS) as the basis of the investigation. In the analysis the second wave of the Austrian HFCS, which was conducted in 2014 and 2015, is taken. The HFCS is a euro area-wide project coordinated by the European Central Bank (ECB). The OeNB is responsible for conducting the survey in Austria. HFCS data provide detailed information on the entire balance sheet as well as several socioeconomic and sociodemographic characteristics of households in the euro area. In particular, the survey provides information on the wealth held in a household's main residence (HMR) and other real estate. In addition to the estimated market price of a particular property at the time of the interview, the survey also collects information about the value of each property at the time when the household acquired (or built) this property. Furthermore, information of potentially multiple loans to finance the HMR of each household are collected as well as outstanding and initial loan amounts and there is also information on interest rates and loan terms. All this information is used in the analysis at hand. We additionally use some specific variables for Austria which are not publicly available, such as, the information on payments into the repayment vehicles of bullet loan holders, which are not part of the core variables of the HFCS; these data are additionally collected in Austria due to the relatively high prevalence and thus importance of this type of credit. We include such payments into the definition of debt service. We also include Austria-specific information on net income (see below) or the region where the household is located to estimate the house price equation. The results reported in this study apply to households in Austria only. All estimates are calculated using the final household weights and the survey's multiple imputations (see Albacete et al., 2016b, for a detailed description of the survey methodology in Austria). The net sample of the HFCS 2014 in Austria contains 2,997 households. Of these households, about half own their main residence and about 400 (i.e. 15.5% of the household population) have outstanding mortgage debt for their main residence. Overall, the methodology of the second HFCS wave 2014 follows – with some improvements – that of the first HFCS wave (2010) and is documented in Albacete et al. (2016b). Thus, for the specifics of the survey the interested reader is referred to the documentation.

For our present analysis, we need to construct three ratios: LTV, DTI and DSTI. For simplicity reasons, we restrict the analysis to mortgages taken out to finance a household's main residence only. As we are interested in these ratios at the time of the origination of the mortgage, we approximate them by using some retrospective information available in the HFCS. We estimate the LTV by dividing the sum of a household's main residence mortgages at origination by the value of the household's main residence at acquisition. This ratio is called initial LTV and used throughout the analysis. The initial DTI is estimated by dividing the sum of a household's main residence mortgages at origination by the yearly net household income at the time of loan origination.[2] The DSTI is estimated by dividing the sum of all annual mortgage payments (including savings for bullet loans) for the household's main residence (at the time of the interview) by the household's net annual income (at the time of loan origination). Furthermore, the maximum credit ratios reflecting the prevailing market condition with respect to the highest ratios that are financed by the banking sector

[2] For more details on the construction of household net income the interested reader is referred to Albacete and Lindner 2017.

should be given by relatively high percentiles of their distribution. Kelly et al. (2015) propose to use the 98th percentile from the credit register. Because of the structure of the survey and the relatively small number of observations we take the 75th percentile for LTV and the 95th percentile for the other two ratios.

Finally, for the calculation of available credit as laid out above we also need to construct the following additional variables: the household's down-payment, which is defined as the difference between the value of the main residence at the time it was acquired and the initial amount borrowed at the time the loan was granted; the interest rate, which is measured by the current interest rate paid by the borrower; and the maximum loan term allowed by banks in order to repay mortgages (TERM), which is measured by the 50th percentile of the maximum loan term distribution across borrowers.

Results

This part provides the results based on the empirical exercise described above.

Market conditions

First, we need to look at the general market conditions for the HMR mortgage market in Austria as found in the HFCS. Table 1 in slide 11 in the appendix provides the prevailing market conditions based on the percentiles specified above, the resulting maximum credit available along each channel and the share of households for which the specific channel is binding. It does not only provide the overall structure but also allows to inspect the trend over the last years.

The median volume that banks are willing to supply to a borrower applying the LTV criterion (middle panel in table 1) is given by about 924,000 euros. This relatively large amount is due to the relatively high prevailing maximum LTV that the market allows a household, as can be seen in the 75th percentile of the LTV distribution in the bottom panel in table 1 (see slide 11), i.e. the maximum LTV is estimated to 90,5%. At the median the maximum credit along the DTI and DSTI channel is given by 370 and 380 thousand euro respectively. One has to keep in mind that these results are medians and are based on a complete distribution based on household individual wealth and income levels (as well as term and interest rate levels for the DSTI channel). The total credit available for each household is given by the minimum of the three figures in the middle panel of table 1. Thus, at the median overall credit available to a HMR mortgage borrower is about 370 thousand Euros. Obviously, this figure is well above the median level of initial loan amount at the time of loan origination since not all households need to take out the maximum amount available. Additionally, we see that for most households that binding channel is given by DTI followed by DSTI. This points towards a bigger impact of a policy focusing on these measures compared to the LTV channel.

The table in slide 11 additionally presents the development of indicators over time in order to inspect potential changes in the impact discussed below. We find that although income-based borrowing conditions tightened slightly over time, the maximum credit available in absolute terms increased and the share of binding conditions remained stable, and thus the underlying structure seems to be relatively

stable as well. As the HFCS collects only data on outstanding loans and households pay back their mortgages over time, the number of observations is low early on (i.e. about 25 in the time bracket 1990-1994) but increases over time (i.e. about 120 in 2005-2009).

Simulation

Before discussing the results from the simulation, we need some information on the estimation of the house price model for Austria using HFCS data. We restrict the estimation sample to homeowners with an outstanding mortgage taken out to acquire their main residence, so that the estimation sample includes about 400 observations. We do this because the measure of credit available based on all three channels is only available for households holding an outstanding mortgage – at the time of the interview. As control variables we use a broad set of household and real estate characteristics. The former include age (linear and quadratic), income, down payment, and obviously credit available to the households. The latter are region, size of the households' main residence, time since loan origination, time of living in the household, and paradata about the real estate such as type and rating of dwelling, as well as rating of the surrounding area and also outward appearance of the real estate as recorded by the interviewer. The estimates of the house price equation are used for the simulation.[3] Overall, we find in general a positive but small (and partly statistically insignificant) correlation between credit available and house prices. Results from the regression can be inspected in slide 23 in the appendix.

The first column in table 3a (see slide 12 in the appendix) shows the starting point of the simulation in the baseline scenario with the market conditions found in the HFCS (see also table 1 in slide 11). Then we first simulate a 5ppts decrease of the maximum LTV, followed by a 1-year reduction of the DTI and a 5ppts decrease of the maximum DSTI. The last column provides the results of the combined scenarios where all the three previously separately analyzed reductions are put into one simulation.

The top panel again (as in table 1) shows the share of the binding constraint in each simulation whereas the second panel shows the maximum credit available along each channel in each scenario. The last panel is reserved for the results on the average changes in house prices as well as the maximum credit available due to the change in policy rates.

Table 3a shows that a reduction of the maximum LTV reduces the median maximum credit available along this channel to around 550,000 Euros – quite a substantial reduction. Also, the share of households for which this channel is binding increases substantially. However, the impact on the overall house price level and the maximum credit available is limited. This general picture is similar also for the other two channels, with the DTI channel having the larger impact on credit available and house prices. Combining all three measures results in a larger impact since now households are affected along all channels at the same time. Thus, a particular household may, for example, have an income high enough to accommodate a change in the maximum DSTI, but at the same time may well be affected by the change in the maximum LTV. The same may hold for other households the other way round. Overall, the modelled changes imply that the share of households for which the maximum LTV is binding increases whilst the share for which the maximum DTI and

[3] Results from these regressions are provided in Albacete and Lindner (2017).

DSTI is binding decreases. In summary, all results point toward a relatively modest impact of the modelled changes.

As mentioned above we also simulate an average decrease of credit available of 30% (a more restrictive case in terms of reduction of credit available), the results of which are shown in table 3b (see slide 13 in the appendix). The idea behind this discussion is to evaluate the size of a policy change needed in order to generate a certain result.

Thus, we see in the last line of the table that the change of credit available always amounts to -30%. This would be associated with lower house prices of about 3%. Columns 2 to 4 show the change needed in each of the three policy measures. A grid search yielded this result. We find that along the LTV channel a reduction of 21 percentage points (starting from the around 90% in the base line market condition) would make this threshold binding for close to 60% of borrower households in the HFCS and the median maximum credit is reduced to about EUR 210,000. The same impact in terms of the average change of credit available would be reached over a reduction of the DTI ceiling by 4.3 years or a reduction of the DSTI ratio of almost 25 percentage points. In each case the respective policy rate would be binding for almost all households. In the case of the combined scenario we can see that much smaller reductions in each channel together result in the same decrease in credit available. Note, that for the combined scenario we report only one possibility. There are many alternative policy mixes (as example columns 2 to 4 can be inspected) that might yield the same simulation results.

Affected households

In the last step, we provide some first information regarding borrowers that are potentially affected by macroprudential measrures. We do that by identifying households that under the combined scenario would no longer be able to finance the full amount actually observed. Since the prevailing market conditions are based not on the maximum observed values but some smaller percentiles, there are a few households (1.5%) that are affected in the baseline scenario. We define a household as being affected by the above introduced combined scenario if the newly derived maximum credit available is below the initial amount of loan taken out.

In table 4 (see slide 14 in the appendix) we report some general descriptive statistics of the overall household population, the mortgage holders for the households' main residence and the group affected by the combined scenario.

We see that households with HMR mortgages are more affluent than the overall population both in terms of wealth as well as current annual gross income and that the ones affected by macroprudential policies are likely to be households that are more affluent than the overall population as well. Within the group of mortgage holders, however, they are the less affluent households in terms of both wealth and income levels. We also check several other socio-demographic characteristics not displayed in the table in slide 14, but it turns out that the group of affected households seems – with the exception of income and wealth – not to be much different from the average mortgage holder (in terms of, e.g., age). It can also be confirmed that among the affected households in the scenarios there is a substantial share of households that is identified as potentially vulnerable according to several standard vulnerability measures (e.g. DTA>100%, DTI>300%, DSTI>40%).

Concluding remarks

In this paper, we adapted the approach developed by Kelly et al. (2015) to the Austrian case and to household level survey data. Instead of credit register data we use data from the second wave of the Austrian HFCS for 2014/15, which allows us to characterize in detail the households affected by the simulated macroprudential policy measures.

In a first step, we estimate the credit supply of banks to households on the basis of the three standard credit ratio criteria LTV, DTI and DSTI. We find that the income-based criteria (DTI and DSTI) are the ones which are most often binding for Austrian households. Hence, a policy focusing on the LTV ratio is expected to be less effective than limiting the DTI or DSTI.

In a second step, we estimated the house price model and show that the amount of credit that is available to each borrower has a positive but small impact on the value of the main residence that is purchased. In other words, mean main residence prices do not seem to be strongly credit driven in Austria. However, it could well be that certain quantiles of the main residence price distribution or main residence prices of certain borrower groups (e.g. foreign currency borrowers) or house prices of other properties than the main residence would still change under such scenarios. This is left for future research.

In a third step, we simulate the impact of macroprudential policy interventions on the Austrian housing market. We consider several scenarios that involve restrictions on each of the following ratios: LTV, DTI and DSTI. According to our findings, in Austria, macroprudential policy interventions would be effective in reducing credit supply to households, but less so in slowing down a rapid increase of house prices. Moreover, the impact on house prices is found to depend on the levels at which LTV, DTI and DSTI limits are set. The analysis just simulates the impact on credit supply and does not simulate the impact on the credit actually given to the household or newly granted credit by banks (which would also depend on credit demand and is beyond the scope of this paper).

It is left for future research to analyze what the impact of macroprudential policies would be on rental prices. In Ireland, for example, rental prices have strongly increased since the implementation of macroprudential policies (see RTB, 2016). Furthermore, future analyses of this kind for Austria could be further extended if credit register data covering the whole universe or at least a large part of Austrian households' mortgage loans in their entirety or at least to a large extent, including appropriate information on the mortgage holders, would be available. This would provide a much larger sample and more precise information on the origination of the loans and could help inform the process.

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Peter Lindner and Nicolás Albacete,
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Simulating impacts of borrower based macroprudential policies on mortgages and the real estate sector in Austria

Evidence from the Household Finance and Consumption Survey 2014

Nicolás Albacete and Peter Lindner[1]

(Economic Analysis Division, OeNB)

IFC – National Bank of Belgium Workshop on "Data needs and Statistics compilation for macroprudential analysis"

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Outline

Motivation

Motivation ↪ Discussion on macroprudential policy

- On November 28, 2016: ESRB warning on medium-term vulnerabilities in the residential real estate sector for Austria and seven other EU countries:
  - Rapid rise in (residential) real estate prices, robust mortgage credit growth and risk of a (further) loosening of lending standards
- Response of the Austrian finance ministry, which had been agreed with the Financial Market Authority (FMA) and the Oesterreichische Nationalbank:
  - Mitigating factors not been considered adequately in the ESRB's analysis (low share of mortgage lending, low default and loss ratios, high significance of social and rental housing)
  - Recent measures taken are considered to be adequate in view of the current house price cycle and the current credit cycle:
    - ★ Initiative to preventively create a legal basis for additional macroprudential instruments to enable the FMA to impose limits on loans granted by commercial lenders
    - ★ Communication on three criteria for sustainable real estate lending: LTV, DTI and DSTI ratios ("on the basis of improved reporting, [we] may specify in more detail the criteria [...] and issue recommendations if the need arises")

▸ Literatur

Motivation ↪ Aim of the study

- So far, all the analyses in Austria about household mortgage market and vulnerability focused on the identification of potential weaknesses (e.g. stress testing or FX loans) of this sector
- At least since the FMSB statement there is a need to assess the potential impact of policy measures on households and the real estate market
- Until now there has been a lack of information on this topic. This study intends to shed some first light in this direction.
- The aim of our study: perform an impact analysis of macroprudential intervention in Austria setting constraints to the LTV, DTI and DSTI with a focus on measuring the effects of such interventions on the real estate sector, i.e. mortgage supply and on house prices.
- Approach developed by Robert Kelly, Fergal McCann and Conor O'Toole (2015) **"Credit conditions, macroprudential policy and house prices"** in Research Technical Papers 06/RT/15, Central Bank of Ireland
- Results planned to be published in the Financial Stability Report 33 of the OeNB

Methodology

Methodology ↪ Main steps

- For this analysis we will use the best source of information available, i.e. the second wave of Household Finance and Consumption Survey (2014) for Austria (whole balance sheet of about 3.000 households)

  ▸ More on the data

- The methodology consists basically in four main steps:
  - identifying the market conditions,
  - estimating the maximum credit available to consumers,
  - running house price regressions, and
  - simulating various scenarios of macroprudential policy

Methodology ↪ Available credit

- LTV-channel

$$Loan_{LTV_i} = \frac{deposit_i}{1 - LTV_{Max}} - deposit_i$$

- LTI-channel

$$Loan_{DTI_i} = income_i * DTI_{Max}$$

- DSTI-channel

$$Loan_{DSTI_i} = RepayMax_i * \frac{1 - (1 + r_i)^{-TERM}}{r_i}$$

- Credit available

$$CA_i = Min(Loan_{DTI_i}, Loan_{DSTI_i}, Loan_{DSTI_i})$$

Methodology ↪ House price regression and simulation

- House price regression

$$HousePrice_i = \beta CA_i + \gamma' X_i + \varepsilon_i$$

Simulation scenarios:

- LTV_{Max} minus 5 ppts
- DTI_{Max} minus 1 year
- $DSTI_{Max}$ minus 5 ppts
- Combined
- What does it take to reduce CA by 30% at the mean?

▸ More on model specification

Results

Results ↪ Market conditions

Table 1: Descriptive statistics of the components of credit avaliable and the binding condition

	All	1990 to 1994	1995 to 1999	2000 to 2004	2005 to 2009	2010 and younger (2015)
Share of households for which the binding binding condition is						
LTV	13,6%	11,1%	12,6%	14,0%	16,8%	14,7%
DTI	49,8%	43,7%	46,2%	44,8%	51,0%	52,6%
DSTI	36,6%	45,2%	41,2%	41,2%	32,2%	32,7%
Conditional Median of Maximum Credit given by (in 1.000€)						
LTV[1]	924,4	768,5	1.069,5	902,0	1.046,0	1.126,5
DTI	367,8	182,3	327,5	374,4	427,5	492,0
DSTI	379,7	180,5	328,9	395,8	431,6	496,9
Market condition of thresholds						
LTV (P75)	90,5	68,5	79,8	100,5	85,4	102,4
DTI (P95)	12,4	9,3	12,5	12,5	11,8	8,6
DSTI (P95)	66,5	60,3	70,4	63,6	60,3	51,4

Source: HFCS Austria 2014, OeNB.

Note: The time line refers to the year when the highest household main residence mortgage was taken out.

▸ House price regression

Results ↪ Simulation I

Table 3a: Simulation results

	Base Line	LTV - 5ppts	DTI - 1 year	DSTI - 5ppts	Combined I
Share of households for which the binding condition is					
LTV	13,6%	23,0%	12,9%	13,0%	20,9%
DTI	49,8%	43,9%	66,2%	33,2%	46,5%
DSTI	36,6%	33,2%	20,9%	53,8%	32,6%
Conditional Median of Maximum Credit given by (in 1.000€)					
LTV[1]	924,4	548,8	924,4	924,4	548,8
DTI	367,8	367,8	338,2	367,8	338,2
DSTI	379,7	379,7	379,7	351,1	351,1
Changes with respect to					
House prices	.	-0,6%	-0,6%	-0,3%	-1,3%
Credit available	.	-5,8%	-5,5%	-3,2%	-12,1%

Source: HFCS Austria 2014, OeNB.

Results ↪ Simulation II

Table 3b: Simulating a reduction of available credit of 30%

	LTV - scenario	DTI - scenario	DSTI - scenario	Example of a combined scenario II
Change of				
LTV (in ppts)	-21	0	0	-10
DTI (in years)	0	-4,3	0	-2,8
DSTI (in ppts)	0	0	-24,5	-18,0
Share of households for which the binding condition is				
LTV	57,2%	8,5%	8,5%	24,8%
DTI	22,9%	89,4%	0,0%	32,3%
DSTI	20,0%	2,1%	91,5%	42,9%
Conditional Median of Maximum Credit given by (in 1.000€)				
LTV[1]	208,1	924,4	924,4	379,9
DTI	367,8	240,5	367,8	284,9
DSTI	379,7	379,7	239,8	276,9
Changes with respect to				
House prices	-3,2%	-3,1%	-3,2%	-3,2%
Credit available	-30%	-30%	-30%	-30%

Source: HFCS Austria 2014, OeNB.

Results ↪ Affected households I

Table 4: Characteristics of the households affected by macroprudential policy

	All	HMR Mortgage Holders	Affected households in combined scenario
Share of affected households	100,0%	15,5%	2,2%
Household Wealth (in 1.000€)			
Gross Wealth Mean	275,7	644,8	487,1
Gross Wealth Median	100,4	340,6	318,5
Household Income (in 1.000€)			
Gross Current Income Mean	43,3	60,5	46,3
Gross Current Income Median	35,7	54,5	41,0
Household financial knowledgable person - socio-demographics			
Mean Age	53	48	48
Median Age	54	46	47
Household debt structure			
Median current outstanding debt (in 1.000€)	.	63,1	108,2
Share of vulnerable - DTA>100%	6,3%	1,4%	3,3%
Share of vulnerable - DTI>300%	6,2%	36,0%	62,7%
Share of vulnerable - DSTI>40%	2,6%	15,1%	37,2%
Share of vulnerable - expenses above income	6,9%	12,8%	11,1%

Source: HFCS Austria 2014, OeNB.

▸ More

Conclusion

Conclusion ↪ Discussion

- Income based criteria (LTI and DSTI) are the ones which are most often binding for Austrian households
- Mean main residence prices do not seem to be strongly credit driven in Austria
- Macroprudential policy interventions effective in reducing credit supply to households, but less so in calming a rapid increase in the housing market (impact depends on the levels at which LTV, DTI and DSTI limits are set)
- Data aspects
  - Use of survey data important
  - Additional information form credit register desirable
  - Information needs to include complete balance sheet (partial information often of little use)

Thank you very much for your attention!

Appendix

Appendix ↪ Literature

- Strong increases in available house price indices in Austria are likely to be driven by the upper part of the house price distribution:
  - Albacete, N., Fessler, P. and Lindner, P. (2016) **"The Distribution of Residential Property Price Changes across Homeowners and its Implications for Financial Stability in Austria"** in Financial Stability Report 31/2016, pp. 62–81. OeNB.
- There are various reasons for debt sustainability of the mortgage market for households in Austria; see e.g.
  - Albacete, N. and Fessler, P. (2010) **"Stress Testing Private Households in Austria"** in Financial Stability Report 19/2010, pp. 72–91. OeNB,
  - Albacete, N. Fessler, P. and Schürz, M. (2012) **"Risk Buffer Profiles of Foreign Currency Mortgage Holders"** in Financial Stability Report 23/2012, pp. 58–71. OeNB,
  - Albacete, N. and Lindner, P. (2013) **"Household Vulnerability in Austria - A Microeconomic Analysis Based on the Household Finance and Consumption Survey"** in Financial Stability Report 25/2013, pp. 57–73. OeNB,
  - Albacete, N., Eidenberger, J., Krenn, G., Lindner, P. and Sigmund, M. (2014) **"Risk Bearing Capacity of Households – Linking Microlevel Data to the Macroprudential Toolkit"** in Financial Stability Report 27/2014, pp. 95–110. OeNB,
  - Albacete, N. and Lindner, P. (2015) **"Foreign currency borrowers in Austria evidence from the Household Finance and Consumption Survey"** in Financial Stability Report 29/2015, pp. 93–109. OeNB.

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Appendix ↪ HFCS

- Euro area wide effort to collect micro data on household finances
- Data on the whole balance sheet
- 2^{nd} wave 2014/2015 with 20 countries (1^{st} wave 2010/11 with 15 countries)
- Ongoing project with intention to collect data every 3 years
- Ex-ante harmonization not only of the questionnaire but the whole data production process
- Computer Assisted Personal Interviews (CAPI)
- Harmonized Bayesian-based multiple Imputation procedure
- ECB coordinates project and checks the quality
- Variance estimation based on 1.000 replicate weights (bootstrap procedure)
- Second wave net sample more than 84 thousand households, about 3.000 in Austria (SCF in the USA: 6.500)

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Appendix ↪ Model specification and robustness checks I

- Income based specification
  - HFCS in AT collects gross (net) yearly income for calendar year preceding interview → use trend of average disposable income to estimate income at the time of loan origination (income structure constant)
  - Use initial net income to be in line with general discussion
  - 95^{th} Percentile of DTI and DSTI
- LTV
  - Initial LTV collected in the HFCS in terms of both value of HMR at the time of ownership transfer and loan at origination
  - Abstract from specifics of ownership transfer and building
  - 75^{th} Percentile initial LTV
- Term length
  - Median maximum (if a household holds more than one HMR mortgage) term length of mortgage loan
  - Reflects 25 years common in Austria

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Appendix ↪ Model specification and robustness checks II

- Interest
  - Median of potentially multiple interest rates for HMR mortgage of a single household
- Robustness checks
  - House price regression:
    - ★ various specifications
    - ★ levels as well as logs (inverse hyperbolic sine transformation)
  - Market conditions:
    - ★ LTV of 90%
    - ★ LTV of close to 100%
  - Income:
    - ★ net and gross income
    - ★ initial and current income

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Results ↪ House price regression

Table 2: House price regression

	Full Sample		*Restricted Sample*		*Unweighted Regression*	
	Level initial house value	Logarithm initial house value	Level initial house value	Logarithm initial house value	Level initial house value	Logarithm initial house value
	I	II	III	IV	V	VI
Credit available (CA)	0.062	0.332***	0.110	0.339***	0.061	0.351***
	(0.074)	(0.101)	(0.082)	(0.108)	(0.067)	(0.108)
Total household initial net income	-0.137	-0.149	-0.263	-0.139	-0.158	-0.176
	(0.898)	(0.130)	(0.840)	(0.124)	(0.965)	(0.137)
Value of put down deposit (equity capital, down payment)	0.835***	0.040***	0.652***	0.027***	0.880***	0.043***
	(0.186)	(0.007)	(0.218)	(0.006)	(0.116)	(0.006)
Age	-4,200.853	-0.013	-1,455.621	-0.007	-5,445.458	-0.021
	(5,891.842)	(0.026)	(4,164.130)	(0.022)	(4,791.668)	(0.020)
Age squared	33836	0.000	13071	0.000	43119	0.000
	-57930	(0.000)	-41382	(0.000)	-48594	(0.000)
Controlled for [1]						
Region	X	X	X	X	X	X
Time brackets of loan originiation	X	X	X	X	X	X
Size of HMR	X	X	X	X	X	X
Duration of living in the HRM	X	X	X	X	X	X
Type of dwelling (paradata)	X	X	X	X	X	X
Dwelling rating (paradata)	X	X	X	X	X	X
Dwelling location (paradata)	X	X	X	X	X	X
Outward appearance of dwelling (paradata)	X	X	X	X	X	X

Source: HFCS Austria 2014, OeNB.

Notes:

1) Every regression includes a constant.

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Results ↪ Affected households II

Table 5: Share of aggregate debt held by households affected by macroprudential policy

	Base Line	Combined Scenario I
Conditional share of affected households	9,7%	14,0%
Conditional current share of aggregate HMR mortgage	16,6%	23,4%
Conditional initial share of aggregate HMR mortgage	8,3%	11,1%

Source: HFCS Austria 2014, OeNB.

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