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Article

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Assessing Explanatory Power of Household Debt for House Prices[1]

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Abstract

This paper contributes to the evidence that household credit relative to disposable income is a useful factor to inform house prices. This finding is observable both from persistent direct link between the two variables as well as from the relationship of credit with a residual of house price valuation equation. The latter has capacity also in its simplest form to identify overvaluation or undervaluation of property prices and relate them to actual market corrections observable over the post-crisis period in individual countries.

Keywords: *household debt, credit growth, house prices*

JEL Classification: E51, H31, R21

Introduction

In the past decades of economic history we find frequent evidence of co-movements between house prices and credit growth. In many countries, evidence of such co-movement is often aligned with cycles in economic activity, commonly referred to as booms and busts. Although, credit growth, output growth and house prices inflation are interlinked, the strength of these links is subject to different factors.

The channel between credit and house prices works its way through a wealth effect so that decline in property prices affects real estate collateral used to

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secure new loan and hence constrains borrowing capacity of the borrower. Symmetrically, positive change in property prices increases value of assets used as collateral and hence improves credibility of household.[2] Banks would be thus more willing to extend existing, or grant new, loans (see e.g. Sivák et al., 2013).

There has been also ample evidence that house prices help to identify long--run relationship between real credit and real GDP (Hofmann, 2001), which would otherwise be difficult to find despite theoretical literature dealing with credit demand factors would suggest (e.g. Nieto, 2007). However, a common denominator in this relationship is real spending, which is determined by changes in both income and wealth. While changes in income are closely related to output, changes in wealth are to large extent related to real assets, namely to own occupied housing.[3]

Changes to household wealth would therefore be strengthening the link between house prices and credit, while on the other hand, changes to income would have consequences for the link between credit and output. Given the recent evidence of increasing difficulties to climb the ladder in wealth distribution with higher income (e.g. Laitner, 2014), it seem that wealth is enjoying increasing importance in the society. In turn, increasing importance of house prices should be effectively reinforcing the link between credit growth and output growth, also referred to as synchronisation between financial and business cycle.

In fact, contemporary studies are generally finding significant circular effects between money growth, credit growth and house prices. On top, these effects are found to be stronger in financially deregulated markets and in the events of high house price increases (Goodhart and Hofmann, 2008). Recent decades have witnessed unprecedented increase in both house prices and credit growth, leading to large volumes of household debt posing a risk to financial stability. The latter relationship between house prices and household debt will be at the centre of our interest in this article.

Dynamics of household debt may strongly interact with the dynamics of house prices, and vice versa. Rising house prices may trigger more demand for credit to buy housing, leading to higher household debt. In turn, higher house prices may provide for higher collateral values and thus a more relaxed stance in the supply of credit, also potentially leading to higher household debt. Therefore, a positive relationship between household debt flows and house prices may be expected.

[2] For instance, Čaplánová (2003) relates credibility also to education level of individuals, often treated as a factor of country economic growth.

[3] According to the Household Finance and Consumption Network (HFCN) report from the first wave, which has collected information in 2010, 71% of all household assets were real estates. See more in ECB (2013).

The aim of this article is to investigate the link between the house prices and household debt dynamics in European economies, to shed more light on the heterogeneous development in individual euro area countries and use panel estimation technique to understand to what extent the credit growth informs house prices has in general. On top of traditional link between credit supply and house prices as studied by many authors in the past (e.g. in Favara and Imbs, 2015; Justiniano, Primiceri and Tambalotti, 2015; or Runstler and Vlekke, 2016), we aim to provide more insight also from further dimensions, namely i) whether the relationship holds if we consider different concepts of excessive growth of credit and/or ii) if the relationship holds once house prices are filtered for macroeconomic factors that are understood as their usual drivers.

Section 1 walks you through the current state of the literature in this field. Section 2 describes the dynamics of household debt and house prices development over the recent period and data used in the analysis in general. Section 3 provides quantitative analysis of the relationship with a brief discussion. Last section wraps the results and concludes.

1. Theoretical Background

The central relationship of our interest, i.e. the link between house prices and credit is not so much discussed explicitly, but mostly via the context of leverage cycle. The reason behind is the specificity of household prices among macroeconomic variables. As Hall, Psaradakis and Sola (1997) emphasize house prices present an interesting challenge since they have increased considerably and in non-linear manner over the last several decades. On top, the series is very volatile, incorporating several boom and bust periods (two in 1970's, one in late 1980's and the greatest of all in mid-2000s). Housing market is however a type of asset that is reproducible. Therefore, booms may be a matter of rational market bubbles, but periodical busts may well have real effects (more construction starts while prices were on the rise) and hence change market fundamentals (Blanchard and Watson, 1982).

Despite, Holly and Jones (1997) use historical dataset for the UK starting in 1939 to find the single most important determinant of real house prices is real income. They also however note considerable and protracted periods of disequilibrium, which they relate to innovations and show that real house prices are fairly quick to close the gap to adjust to new equilibria. It is therefore apparent that the link between house prices and income is far from complete. That piece of information – hidden behind the term innovation – is explained in the literature mostly by three diverse streams. In general authors address either housing

market frictions, or link between household credit and/or debt development or full scale of fundamental factors aside from credit also demography, housing stock or interest rate conditions.

From among the first mentioned stream, Ayuso and Restoy (2003) attempt explaining changes in house prices by studying their relationship to rental prices, which are more dependent on housing demand and supply. Housing market is far from being friction-free and therefore different authors mention multiple other factors that carry information content on supply and demand mismatches; as for instance vacancy rate, costs arising from effective tax rate on housing, ability to supplement transaction costs with discount of nominal value (Genesove and Mayer, 2001) or net wealth of households that would factor their liquidity constraint to afford better housing (Ortalo-Magné and Rady, 2006).[4]

Gimeno and Martinez-Carrascal (2006) look strictly at the link between house prices and mortgages and show that the two variables are very much interdependent mainly in long-run. Using Spanish data they conclude that loans for house purchase depend positively on house prices, while house prices adjust when credit aggregate departs from the level implied by its long-run determinants. They also confirm the above finding from UK data that disequilibria in house prices are quickly adjusted by less demand for credit. The pre-crises growth pattern of credit and debt in many countries reignited discussions whether the evidence is not based merely on significant resort to borrowed funds by households and lively construction sector and property development, hence whether both housing prices and indebtedness had not stood at levels above those implied by economic determinants.

Studies as the one by Martinez-Pages and Maza (2003) tackle this concern by error-correction model (long-run relationship) of house prices on gross disposable income and interest rates. Adding further fundamentals to such analysis, as in their case, usually confirms the overvaluation of house prices in the pre-crisis period. Different approach is taken by Egert and Mihaljek (2008), who rather than calling disequilibria interpret similar results as different response to changes credit in some (advanced) economies. Similarly, they base their findings on a panel analysis by investigating various house prices determinants as income per capita, real interest rates, access to credit, and demography in a dynamic panel analysis of 19 OECD countries. Although they find strong information content of income per capita, interest rates and household credit for house prices, some unexplained factors were still identified as institutional factors and level of development in housing markets and housing finance.

[4] Ability to put down minimum required extra cash depends on the value of the home-owner house price. If it increases, it is easier to meet the initial payment condition, which stimulates the demand for housing and again in a self-fuelling process stimulates new price increases.

Some different conclusions on the role of housing markets are however obtained in Brůha and Tonner (2014). Incorporating a housing market in the forecasting DSGE model for a small open economy (Andrle et al., 2009), the authors find that the feedback between the housing market and the macro variables is weak. As a consequence, the amplification effects are very mild. The likely reasons are that the monetary policy rule in the Czech Republic does not explicitly contain house prices and the wealth effects stemming from home ownership are not significant.

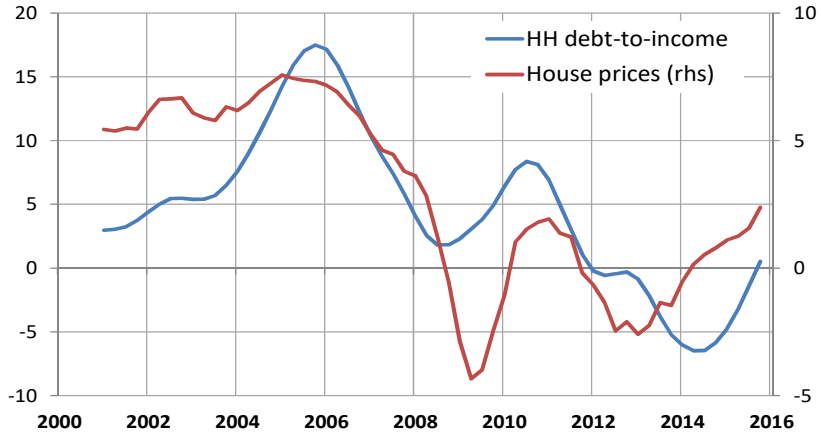
Otherwise however, vast majority of studies do appreciate importance of household debt for the macro economy and for financial stability (e.g. in Walentin, 2014). It is however interesting to note that household debt holdings that enter the relationship under our investigation, may be subject to significant heterogeneities. Debt holdings may be substantially different across countries (Andre, 2016 or Bover et al., 2014) or very unevenly distributed across the age groups (Christelis, Georgarakos and Haliassos, 2013).

2. Dynamics of Household Debt and House Prices

As outlined earlier, house prices and the household debt to income ratio have moved in parallel during the run-up of, and also throughout, the financial crisis. The correlation between the two series was relatively strong in the euro area since 2000 as reflected in the positive correlation (0.70).

F i g u r e 1

Co-movement of House Prices and Household Debt



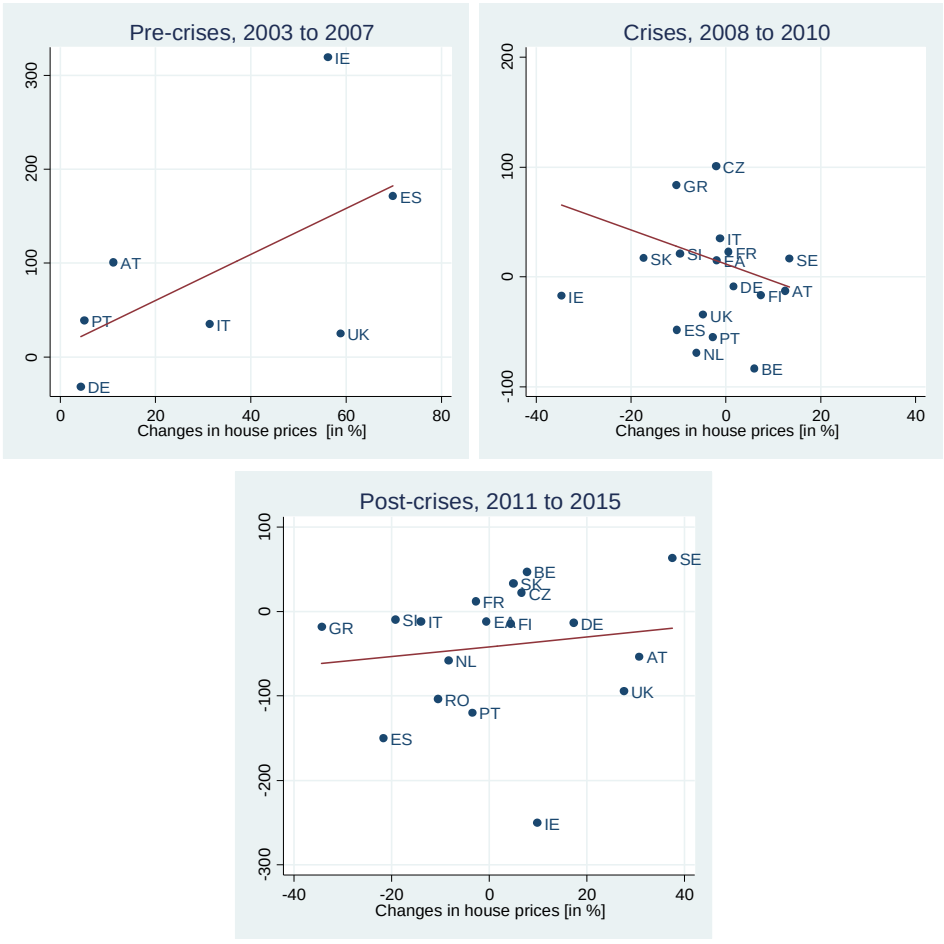
Note: Year on year change in nominal house prices is on the right hand scale in percentage. Year on year difference in household debt to disposable income is in percentage points on the left hand scale. The series is HP filtered.

Source: Own calculation based on IMF IFS and OECD original data.

In the years preceding the financial crisis, house price growth was supported by improvements in housing demand conditions, as reflected in increasing real income and a general downward movement in real mortgage rates. In turn, this led to higher demand for credit. In addition, credit-supply factors, such as the liberalisation of financial markets, financial innovations and the introduction of variable interest and instalment free loans, increased the borrowing opportunities of many households, which in turn bolstered the demand for housing and house prices.

F i g u r e 2

Household Debt and Nominal House Prices



Note: Changes in house prices are in nominal terms. Change in household debt to disposable income is expressed in percentage points on the vertical axis.

Source: Own calculation based on IMF IFS and OECD original data.

Taking a purely statistical perspective, Alessi and Detken (2011) show that credit indicators, in particular at the global level, contain information for predicting asset price boom/bust cycles which have severe consequences for the real economy, i.e. mostly those involving house price misalignments. This finding is also confirmed by Borio and Lowe (2002) and Gertler and Hofmann (2016) who show that excessive growth of credit transmits into imbalances that manifest themselves in higher chance for the outbreak of financial crisis.

The co-movement between house prices and household indebtedness observed for the euro area on the Figure 1 is also found across countries. The upper left panel of the Figure 2 relates house price increases to increases in household debt over the pre-crises period (2003 – 2007) across advanced economies (for which house price data are available). The link is not anymore so obvious once the financial crisis hits. Several countries managed to undergo stronger deleveraging process of their private sectors, while some countries (as for instance Greece) were not able to deleverage despite decline in house prices. This was mainly due to rapid fallout of household income relative to debt which remained high given increasing risk premium (Figure 2, upper right panel). Market adjustment to the crisis however had very uneven character, which has reflected in geographically heterogeneous house prices. As noted earlier, Holly and Jones (1997) proposition about house prices being swift in correcting for disequilibria, seems materializing in the post-crisis period (also as in Turk, 2015). This may be seen on the bottom left panel of the Figure 2, where development of house prices seem to well reflect position of the economy of individual countries, while witnessing re-emerging, although still fair, link between leverage and house prices.

3. Analysis and Results

Seeing the above evidence, one could argue that indebtedness of households does not inform house prices completely and in order to do that one has to take account of structural information. The analysis therefore proceeds as follows.

In the first step, we estimate real house prices on the essential structural determinants (income and real interest rate) in a fixed effect model. Residuals from this estimate should capture the effect that is missing, ergo a valuation measure, which informs us about imbalances on the housing market. We suspect these imbalances could be explained by credit variables.

In order to obtain a gist of relationship between imbalances and credit, we perform a correlation analysis between house prices and resulting residuals in the second step. In the third step, we establish the link between the house prices and household credit and confirm the link on alternative estimates between the residuals (imbalance proxies) and household credit.

3.1. House Prices Valuation Equation

For obtaining the house price valuation measure, we use an annual dataset of 23 advanced economies[5] for which longer historical record of house prices are accessible. We estimate a hedonic regression inspired by Silver (2016) as a panel with fixed effects model that will capture country specific characteristics, as for instance level of financial infrastructure, specific country property tax legislation or institutions that differ across countries.

$$rhp_{it} = \beta_0 + \beta_1 y_{it} + \beta_2 r_{it} + \beta_3 p_{it} + \chi_i + u_{it}$$

where explanatory variable y_{it} stands for log level of real income (capturing in general demand of households), p_{it} represents share of active population to total population (capturing demographics, or proxy for number of potential buyers) and r_{it} for long-term real interest rate (informing generally about access to financial resources).

An estimate[6] with full sample of countries yields coefficients with expected signs and strength. In general, each one percent increase in real income is associated with half percent increase in real house prices and one percentage point increase in real long-run interest rate is associated with their approximately 2% decline.

T a b l e 1

Structural Determinants of Real House Prices

corr(u_i, Xb) = –0.8684				F(3, 757) = 38.17		
				Prob > F = 0.0000		
lhpr	Coef.	Std. Err.	t	P>|t|	[90% Conf.	Interval]
irlr	–.0178753	.0036448	–4.90	0.000	–.0238777	–.0118728
y	.47284	.0577805	8.18	0.000	.3776831	.5679969
lf	–6.183988	1.179841	–5.24	0.000	–8.127031	–4.240945
_cons	5.679018	.619969	9.16	0.000	4.65801	6.700026
sigma_u	.94543834					
sigma_e	.33670586					
rho	.88744233	(fraction of variance due to u_i)				
F test that all u_i = 0:		F(22, 757) = 64.95			Prob > F = 0.000	

Note: Output from the fixed effect estimation.

Source: Own estimate based on IMF IFS and OECD original data.

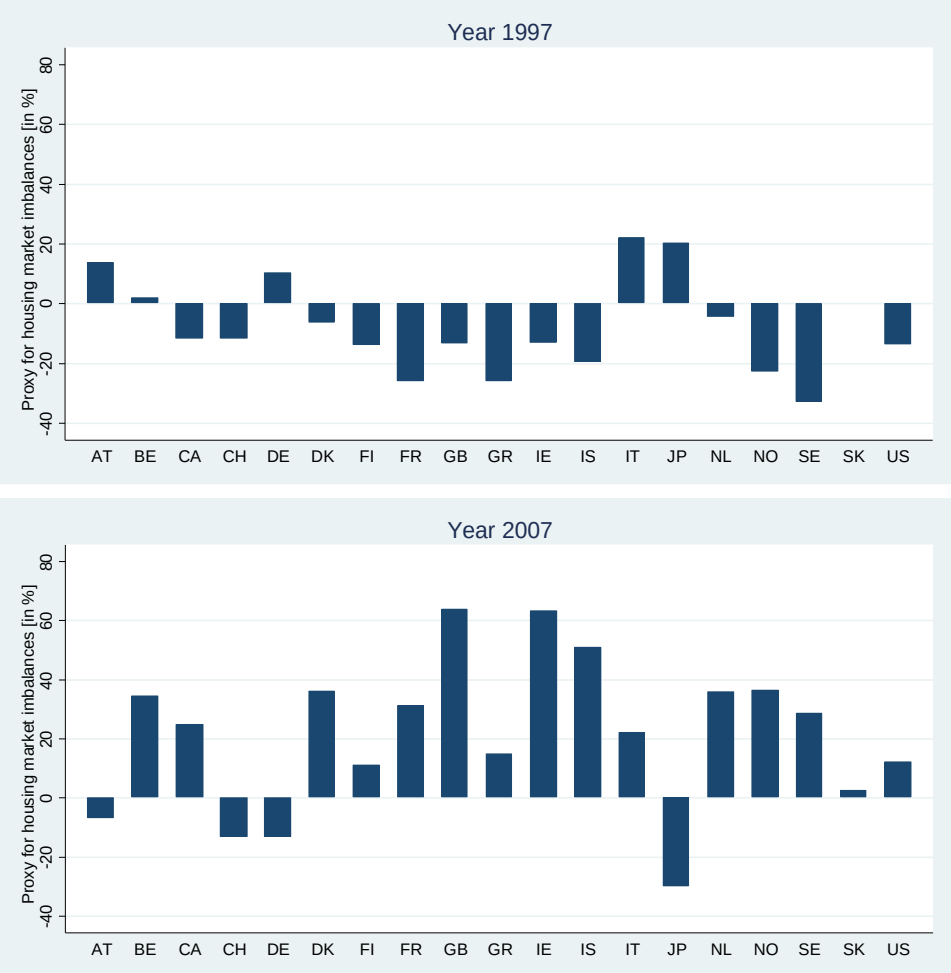
[5] The countries in our sample include: United States, United Kingdom, Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Greece, Iceland, Ireland, Portugal, Spain, Australia, New Zealand and South Africa.

[6] All explanatory variables have been tested by panel based Dickey-Fuller unit root test (up to 4 lags) and confirmed to be stationary processes.

However, marked differences across countries and across time as regards the joint household debt-house price dynamics may be attributed to different factors affecting both house prices and household leverage. Policy measures targeting the housing market (e.g. property taxes) or easing household financing conditions are prominent examples directly affecting house prices. It is not surprising that the expected joint dynamics of the household debt ratio and house price differ from those based on historical records.

F i g u r e 3

House Price Valuation Residuals



Note: Blue bars represent percentage deviation from estimated equilibrium level based on data starting in 1980. Inclusion of Slovakia in this figure is limited given the property price series are only available only since 2002. Resulting imbalance indicator in 2007 would therefore be inconsistent with the rest of the sample. If treated separately, it suggests normalisation of housing market imbalances in Slovakia following the crisis on close to zero levels (from the peak of 20% above the equilibrium in 2009).

Source: Own calculation based on IMF IFS and OECD original data.

Due to the link between developments in house prices and household indebtedness, house price valuation indicators can be used to assess expected developments in the correction of house prices, thus provide some insight on deleveraging pressures. From the Figure 3, it could be read that in almost all advanced economies real house prices have been somewhat below their estimated equilibrium level in 1997, while they rose rapidly in the following decade to reach some 30% overvaluation in average until 2007. This then relates to value that market theoretically needs to correct for in order to arrive to the equilibrium again.

Marked differences are also seen across countries. While economies with deeper capital markets (as Britain, Ireland and most of Nordic countries) within one decade have grown their house market valuation relative to equilibrium by 40 – 60 percentage points, Germany or Austria reinforced their fundamentals relative to house prices to even scale down in their relative house market valuation measure. Post-crisis house price development in these countries also reflected very limited need for corrections.

Post-crisis downward adjustment of house prices brought them closer to their underlying values. For instance, in Spain and the Netherlands the adjustment brought house prices indeed to 60% (and 70% respectively) by 2014 of their pre-crisis level, i.e. erasing fully the overvaluation indicated by the measure computed above. This reflects weak housing demand conditions until recently, however exceptionally easy policies recently caused adjustment to have bottomed in many countries and expected to return towards more elevated levels.

3.2. Housing Market Imbalances and Credit

A more detailed analysis of the link between house price and household debt dynamics can be based on assessing the correlation between the residual of the house price equation based on structural determinants and credit measures to households. Strong positive co-movement between the residual of the house price equation and credit to households exists in many countries (see Figure 5), suggesting that in some countries credit growth to households and house price developments are clearly linked, even after controlling for underlying values.

It needs to be noted that these are correlations, not causal links, and neither these are adjusted for eventual trend arising from catching-up process during the convergence era prior to the financial crisis. Presence of convergence is especially visible in the case of Slovakia, where household debt ratios are kept in check while new credit in real terms was fuelling the real estate market. Whether this is related to convergence or other factors, high correlation of real credit with house prices (marked as green) should not be interpreted as a threat to financial stability, unless it runs hand-in-hand with household indebtedness.

Based on the above correlations, two groups of countries can be identified. The first group exhibits strong correlation between real credit and the residuals of the housing demand equation (upper section of the Table 2). For this group the residuals of the house price equation exhibit large variations, indicating possible omitted variable problems in the housing demand equation; likely having relevance to financial stability concerns. The second group exhibits weak correlation between credit and house prices (see lower section of the Table 2).

T a b l e 2

Leverage and House Prices

		Real house prices vs.			Residual from the equation vs.		
		Household debt to disposable income	Household debt to GDP	Real credit	Household debt to disposable income	Household debt to GDP	Real credit
Ireland	IE	0.8747		0.8389	0.7760		0.7760
Spain	ES	0.8267	0.5846	0.7956	0.7842	0.4506	0.6161
United Kingdom	GB	0.6124	0.4768	0.7488	0.6173	0.5966	0.7951
Italy	IT	0.3711	0.6654	0.6904	0.5887	0.5952	0.4499
United States	US		0.7909	0.6728		0.5939	0.4617
Belgium	BE	0.2148	0.5837	0.6457	0.3936	0.5997	0.5698
Netherlands	NL	0.4401	0.3323	0.6279	0.4437	0.3552	0.6336
Denmark	DK	0.4111	–0.4704	0.6276	0.5085	–0.1192	0.5722
Finland	FI	–0.0634	0.2444	0.6266	–0.0214	0.3785	0.4851
Sweden	SE	0.3885	0.3981	0.6085	0.5568	0.4549	0.5466
Switzerland	CH	0.6346		0.5723	0.5419		0.3935
Portugal	PT	0.4757	–0.0761	0.4271	–0.1221	–0.2825	–0.1369
Germany	DE	–0.0186	–0.1272	0.4152	0.0359	0.3624	0.1890
France	FR	0.2721	0.1650	0.4036	0.4407	0.1258	0.3056
Norway	NO	0.3442	–0.2437	0.3054	0.1938	0.7250	0.0435
Austria	AT	–0.3924	–0.2319	0.2498	–0.3393	–0.1765	0.1670
Slovakia	SK	0.1357	–0.0937	0.9067	–0.1609	–0.2876	0.8241

Notes: Household debt to disposable income and household debt to GDP are used in the first two columns of each block. Real credit in the third column of each block is calculated as nominal credit deflated by CPI.

Source: Own calculation based on IMF IFS and OECD original data.

3.3. Link to Household Credit

The wide range of correlations across countries in Figure 4 suggests analysing the informational content of credit growth to households for house price developments in form of a country-based panel regression. The panel estimation takes the form:

$$rd_{it} = \beta_0 + \beta_1 \Delta cd_{it} + \chi_i + u_{it}, \quad \text{or alternatively} \quad hp_{it} = \beta_0 + \beta_1 \Delta cd_{it} + \chi_i + u_{it}$$

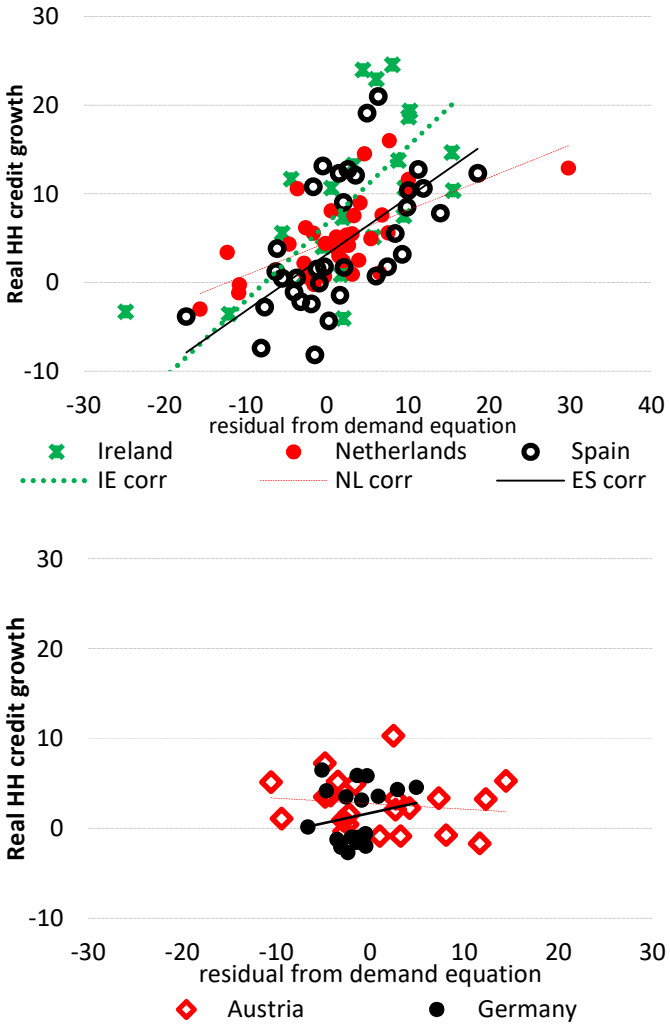
The regression captures the direct link between credit growth cd_{it} and the residuals rd_{it} from the house price valuation equation (which does not include credit growth) and also accounts for country fixed effects, χ_i.

The results in Table 3 reveal a strong and statistically significant link between credit growth to households and the residuals from the house price equation, column (6), or house prices directly, column (3). A 10% change in real credit to households is therefore associated with some 5% increase in real house prices.

Similar results are obtained using the ratio of household debt to disposable income (columns (1) and (4)) and the debt to GDP ratio (columns (2) and (5)) as explanatory variables.

F i g u r e 4

Correlations between Country Residual from House Price Equation and Real Credit Growth



Source: Own calculation based on IMF IFS and OECD original data.

T a b l e 3

Panel Estimates of Real House Prices and Demand-equations Residuals on Credit Measures and Debt Ratios

	House prices			Residual of valuation equation		
HH Debt to Disposable Income	0.467***			0.474***		
	(0.077)			(0.086)		
HH Debt to GDP		0.708***			1.030***	
		(0.125)			(0.130)	
Real Credit			0.556***			0.473***
			(0.030)			(0.041)
Observations	259	476	880	259	465	756
Groups	17	19	24	17	19	23
RMSE	0.060	0.067	0.061	0.068	0.069	0.080

Note: Dependent variables are in log-differences, explanatory variables in annual growth rates.

Source: Own estimates based on IMF IFS and OECD original data.

Given the results in Table 3 we show that there is indeed a significant relationship between household credit (as a ratio to disposable income) and house prices. On top, we show that house prices development well identifies imbalances with regard to over- or under-valuation of the property market given structural parameters in a given country.

Conclusion

We confirm that developments in household indebtedness are linked to house price developments. For instance, declining house prices may tighten credit supply conditions, as they have an impact on collateral, and at the same time may affect negatively the demand for credit from households. The link holds also when constraining the sample only to the pre-crisis period.

The evidence that house prices are broadly in line with the underlying values suggested by standard house-price misalignment indicators, allow us to conclude that house prices may serve as a factor helping to determine the deleveraging dynamics of households. Still, given considerably large heterogeneity, country specific developments suggest some caution to be in place, even if after controlling for country specific fixed effects.

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