HOUSING DEMAND SHOCKS, FOREIGN LABOUR INFLOWS AND CONSUMPTION

Article published in the Research Bulletin 2020, pp. 29-38
In this paper we propose a Structural Vector Autoregression (SVAR) identification strategy to disentangle two housing demand shocks and their ensuing effect on consumption. This builds on the literature studying the role of the collateral and housing wealth effects on household behaviour. A mix of zero and sign restrictions allows us to disentangle domestic and foreign housing demand shocks, which capture different motivations for owning or using real estate by residents and foreign workers. Using Maltese data over the period 2000 Q1-2019 Q4, we find that both housing demand shocks generate an increase in consumption, in line with the theoretical predictions from micro-founded models with financial frictions. While a domestic housing demand shock drives consumption via both the collateral and housing wealth channels, a foreign housing demand shock operates mainly via the latter. Moreover, these shocks account for about 40% of the fluctuations in house prices and consumption in the long run. From a historical perspective, these shocks exhibit a good match with the dynamics of foreign worker growth and a number of events that are associated with activity in the housing market.

Introduction

A majority of households in Malta are owners of their dwelling, and a subset of these own at least another property. According to the EU-SILC database, homeownership in Malta averaged 80.3% over the period 2005-2019. Besides providing a service, real estate serves an important role as collateral for loans (Spiteri, 2019). In this article, we look at the implications of movements in house prices on household consumption. The literature identifies two main theoretical channels through which house prices affect consumption: the collateral channel and the housing wealth channel (Campbell and Cocco, 2007). The collateral channel arises from borrowing limits that are conditional on the value of housing. An increase in house prices raises the borrowing limit – absent any other changes – which allows households to use the additional resources to smooth consumption. The wealth channel hinges on the ability of households to realise the capital gain by selling part of their holdings of housing, which frees resources that can be used, inter alia, for consumption.

Our contribution is to study the role of housing demand shocks in driving consumption from a macroeconomic perspective. As part of our contribution, we identify two distinct sources of housing market disturbances, which we label domestic and foreign housing demand shocks, respectively. The former captures preference shifters in the demand for housing by permanent residents for long-term use, such as the desire for higher average homeownership, government housing market initiatives, and socio-economic changes such as separations and divorces. This shock is routinely identified in theoretical and empirical studies of the housing market. On the other hand, a foreign housing demand shock is our novel contribution and captures a rise in demand for accommodation by migrant workers.

We consider this to be an important shock to identify as migration flows were positive since Malta's accession to the European Union (EU), and accelerated substantially since 2012. Besides contributing significantly to economic activity (Furlanetto and Robstad, 2019), and in the case of Malta to its economic boom over the past years (Grech, 2015; Grech and Borg, 2018), migration inflows are likely associated with increases in aggregate house prices.
(Saiz, 2007; McDonald, 2013). For this reason, we investigate whether the demand for accommodation exerted by immigrants can also affect consumption through the channels discussed above.

“We investigate whether the demand for accommodation exerted by immigrants can also affect consumption through the channels discussed above”

Using a Bayesian VAR identified through a mix of zero and sign restrictions, we find a positive consumption response to a domestic housing demand shock that raises house prices and credit, in support of the collateral and housing wealth channels. The reaction of consumption is in line with theoretical predictions from MEDSEA-FIN, a dynamic stochastic general equilibrium (DSGE) model with housing and financial frictions calibrated to the Maltese economy (Gatt et al., 2020). Thus, our work also serves as a cross-check on the restrictions imposed in a microfounded model. Additionally, we decompose the rise in consumption into the collateral and housing wealth channels and find they are both equally important in driving the consumption response. A foreign housing demand shock generates a weaker consumption response, and seems to operate mainly through the housing wealth channel. The two shocks combined account for about 40% of the fluctuations of house prices and consumption in the long run, similar to results for Ireland and Spain (Nocera and Roma, 2017). Consequently, we show that both housing demand shocks were important in explaining movements in house prices, credit and consumption over the past two decades and, in addition, align well with a set of relevant historical events, such as the EU referendum/accession and stamp duty reductions.

“We show that both housing demand shocks were important in explaining movements in house prices, credit and consumption over the past two decades”

Methodology
The model we estimate includes both endogenous and exogenous variables and has the following VAR representation:

\[ y_t = A + B t + \sum_{l=1}^{L} C_l y_{t-l} + \sum_{l=1}^{L} D_l z_{t-l} + u_t \]

for \( t = 1, ..., T \), where \( y_t \) is an \( N \times 1 \) vector of endogenous variables and \( y_{t-l} \) a number of lagged values of the latter with \( l = 1, ..., L \). Similarly, \( z_{t-l} \) represents \( M \times 1 \) vectors containing lagged values of exogenous variables. \( A \) is an \( N \times 1 \) vector of intercepts, \( B \) an \( N \times 1 \) vector of coefficients that loads on a linear time trend \( t \) while \( C_l \) and \( D_l \) respectively represent \( N \times N \) and \( N \times M \) matrices containing the slopes relative to the lagged values of the endogenous and the exogenous variables. Finally, \( u_t \) is an \( N \times 1 \) vector of reduced form residuals with \( u_t \sim N(0, \Sigma) \) where \( \Sigma \) is the \( N \times N \) variance-covariance matrix.

We estimate a five-variable Bayesian VAR featuring real GDP per capita, the retail price index (RPI), real house prices, real household credit per capita and real consumption per capita.\(^2\) Our measure of house prices is based on advertised prices as compiled by the Central Bank of Malta and we choose this index as it is the longest available time series for house prices in Malta. Finally, the model includes the real lending rate as an exogenous variable.\(^3\) All the variables are expressed in logarithms with the exception of the lending rate, which is expressed in levels. We use quarterly data with the sample running from 2000 Q1 to 2019 Q4, and we implement zero and sign restrictions using the procedure developed in Arias et al. (2018).

---

\(^2\) We remove the housing rent component from the RPI to make sure that the latter reflects only the price level of all goods except housing. By doing so, the RPI index and the real house prices series used in this model are completely distinct from one another. See Gatt and Ruisi (2020), Appendix A for a full description of the data used.

\(^3\) We do not endogenise the lending rate because it is likely driven by conventional and unconventional monetary policy measures, which are not the focus of this paper.
We fully identify the system with five shocks: the two housing demand shocks, a loan supply shock, and aggregate demand and supply shocks. The two housing demand shocks are the focus of this article as they help us detect the presence of the wealth and collateral channels that run from house prices to consumption through different transmission mechanisms, and allow us to recover counterfactual paths for the observables. The other three shocks are meant to capture the remaining dynamics in the system. We only impose impact restrictions and allow the responses at higher horizons to be driven by the data. The joint use of zero and sign restrictions allows us to distinguish a housing demand shock from an aggregate demand shock. Table 1 summarises the identification of these shocks.

We identify the first housing demand shock – a domestic housing demand shock – as the classic impulse to preferences as specified in DSGE models with housing or land (Iacoviello and Neri, 2010; Liu et al., 2013). This shock represents taste shifters, such as a desire for homeownership or a desire to upsize or downsize a house that one lives in. We label this ‘domestic’ since we have in mind transactions conducted by residents in Malta who are able to purchase a house through a bank loan. We therefore identify a positive domestic housing demand shock as one that raises house prices and credit and has no contemporaneous effect on all other prices. We leave the response of consumption and GDP unrestricted and therefore data-driven. Our prior expectation is that consumption rises in response to this shock, as discussed in the introduction and in line with theoretical predictions from DSGE models (Iacoviello, 2005; Iacoviello and Neri, 2010).

The second is a foreign housing demand shock. This shock captures shifts in the desire for accommodation by non-Maltese residents, namely migrant workers. Although it raises house prices, it has an immediate negative effect on credit per capita, and we justify the latter identifying restriction as follows. A net rise in inward migration raises housing demand and the population size, but since these workers likely do not intend to buy property, at least immediately, then credit for mortgages is unaffected on impact. This assumption is especially valid since the length of stay of foreign workers in Malta is typically short (Borg, 2019) and therefore unlikely to feature the purchase of real estate through bank financing. As a result, we should observe a fall in credit per capita following a foreign housing demand shock on impact, all else being equal, since the stock of credit is unchanged but the population rises.

Results

We present the main results through impulse response functions (IRFs), scaled at a 1% impact rise in house prices, and forecast error variance decompositions (FEVD) over a 40-quarter horizon. Furthermore, we show some counterfactual exercises that highlight the link between house prices and consumption.

A domestic housing demand shock, shown in Figure 1, produces a persistent rise in house prices that spans four years. It also produces a humped-shaped response of household credit, which persists throughout a ten-year horizon, even though house prices experience a correction after about four years. We find a positive median response of consumption to the domestic housing demand shock, in line with the collateral and wealth effect channels discussed

Table 1
IMPACT IDENTIFICATION RESTRICTIONS TO STRUCTURAL SHOCKS

<table>
<thead>
<tr>
<th></th>
<th>Domestic housing demand</th>
<th>Foreign housing demand</th>
<th>Loan supply</th>
<th>Aggregate demand</th>
<th>Aggregate supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP per capita</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Retail Price Index</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Real house prices</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Real credit per capita</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Real consumption per capita</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Source: Authors’ contribution.

Note: The entries refer to the impact response of a variable to a structural shock; + indicates a positive response, - indicates a negative response, while ? indicates that no restriction is imposed on that variable.

We fully identify the system with five shocks: the two housing demand shocks, a loan supply shock, and aggregate demand and supply shocks. The two housing demand shocks are the focus of this article as they help us detect the presence of the wealth and collateral channels that run from house prices to consumption through different transmission mechanisms, and allow us to recover counterfactual paths for the observables. The other three shocks are meant to capture the remaining dynamics in the system. We only impose impact restrictions and allow the responses at higher horizons to be driven by the data. The joint use of zero and sign restrictions allows us to distinguish a housing demand shock from an aggregate demand shock. Table 1 summarises the identification of these shocks.

We identify the first housing demand shock – a domestic housing demand shock – as the classic impulse to preferences as specified in DSGE models with housing or land (Iacoviello and Neri, 2010; Liu et al., 2013). This shock represents taste shifters, such as a desire for homeownership or a desire to upsize or downsize a house that one lives in. We label this ‘domestic’ since we have in mind transactions conducted by residents in Malta who are able to purchase a house through a bank loan. We therefore identify a positive domestic housing demand shock as one that raises house prices and credit and has no contemporaneous effect on all other prices. We leave the response of consumption and GDP unrestricted and therefore data-driven. Our prior expectation is that consumption rises in response to this shock, as discussed in the introduction and in line with theoretical predictions from DSGE models (Iacoviello, 2005; Iacoviello and Neri, 2010).

The second is a foreign housing demand shock. This shock captures shifts in the desire for accommodation by non-Maltese residents, namely migrant workers. Although it raises house prices, it has an immediate negative effect on credit per capita, and we justify the latter identifying restriction as follows. A net rise in inward migration raises housing demand and the population size, but since these workers likely do not intend to buy property, at least immediately, then credit for mortgages is unaffected on impact. This assumption is especially valid since the length of stay of foreign workers in Malta is typically short (Borg, 2019) and therefore unlikely to feature the purchase of real estate through bank financing. As a result, we should observe a fall in credit per capita following a foreign housing demand shock on impact, all else being equal, since the stock of credit is unchanged but the population rises.

Results

We present the main results through impulse response functions (IRFs), scaled at a 1% impact rise in house prices, and forecast error variance decompositions (FEVD) over a 40-quarter horizon. Furthermore, we show some counterfactual exercises that highlight the link between house prices and consumption.

A domestic housing demand shock, shown in Figure 1, produces a persistent rise in house prices that spans four years. It also produces a humped-shaped response of household credit, which persists throughout a ten-year horizon, even though house prices experience a correction after about four years. We find a positive median response of consumption to the domestic housing demand shock, in line with the collateral and wealth effect channels discussed

4 For a full discussion of the identifying restrictions as well as the full set of results please refer to Gatt and Ruisi (2020).
above. The response is low on impact but peaks at just under 0.2% in the period after the shock. The consumption response is very similar to the results in the literature, and the response at four quarters is 0.07%, in the ballpark of the estimates in Jarocinski and Smets (2008) and Iacoviello and Neri (2010) for the United States. The ten-year cumulated responses of house prices, credit and consumption to this shock are 3.3%, 11.1% and 0.9% respectively.

“We find a positive median response of consumption to the domestic housing demand shock, in line with the collateral and wealth effect channels discussed above”

The foreign housing demand shock leads to a very persistent rise in house prices based on the median response, and remains positive for up to ten years (see Figure 2). The consumption response is initially negative but surrounded by a high degree of uncertainty, peaking at 0.05% by the second quarter and staying elevated above zero throughout the response horizon. However, the peak median consumption response is lower than in the case of a domestic housing demand shock and the 68% credible bands are wider and cross zero throughout most of the

Figure 1
IRFs TO A DOMESTIC HOUSING DEMAND SHOCK

Source: Authors’ calculation.
Notes: The figure shows the median response across the identified sets and the 68% credible bands, in percentage deviation from the baseline projection. Values on the horizontal axis are quarters following the shock. We normalise the shock to produce a 1% rise in real house prices on impact.

Figure 2
IRFs TO A FOREIGN HOUSING DEMAND SHOCK

Source: Authors’ calculation.
Notes: The figure shows the median response across the identified sets and the 68% credible bands, in percentage deviation from the baseline projection. Values on the horizontal axis are quarters following the shock. We normalise the shock to produce a 1% rise in real house prices on impact.
response horizon. This highlights the uncertainty around the effects of this shock on macroeconomic outcomes among the set of identified models. This uncertainty could be due to the fact that although inward labour migration has been positive since the early 2000s, most macroeconomic effects became strong enough in the data only following the recent surge in the inflow of foreign workers starting in 2012. Furthermore, a foreign housing demand shock changes the composition of the population, increasing the share of residents who are not able to borrow against collateral. This therefore dampens the potential rise in credit following a rise in house prices and therefore also lowers the aggregate consumption response.\footnote{Conversely, we conjecture that a large share of homeowners in Malta do not refinance their mortgage when the value of their housing wealth rises. This could also explain the muted response of credit and therefore of consumption to this shock.} This makes it hard to identify with precision the effect in our model. Therefore, we cautiously interpret the consumption response as suggestive evidence for wealth effects from house price changes arising from foreign demand shocks. The response of household credit per capita is negative for the first three years, in line with the nature of the shock which increases the population but does not change the total stock of household credit.

Which shocks are important in explaining the fluctuations in the unexpected component of house prices, credit and consumption? Figure 3 shows the forecast error variance decomposition for the five structural shocks which we identify, based on the median draw. The domestic housing demand shock plays an important role in explaining the dynamics of all three variables, both in the short and long run, which we limit to a ten-year horizon. It explains a substantial share, around 50\% and 25\% of the variation in house prices and household credit respectively, in the first few periods following the shock, and about a third of the variation in consumption by the first year. This highlights a potentially strong role for the collateral channel in Malta. The contribution of this shock to house price variation falls to about 30\% in the medium to long term, but rises to about 50\% for household credit. The foreign housing demand shock plays a smaller yet significant role in house price movements across all horizons; about 33\% on impact and slightly lower in the medium to long term. However, it explains a very small share of the unexplained component of consumption.

Our findings are close to those discussed in Nocera and Roma (2017), in particular for Ireland and Spain. In both these countries, housing demand shocks explain slightly more than 40\% of the movements in house prices and about 15\% of movements in consumption at a 20-quarter horizon. Moreover, close to 40\% of the unexplained component of credit is explained...
by the housing demand shock in their study, a result which is largely homogeneous across the seven euro area countries they consider.

The impulse response functions and the forecast error variance decomposition imply a significant role for domestic housing demand shocks in driving consumption. To illustrate the importance of the housing wealth and collateral channels, we build the counterfactual response of consumption to a domestic housing demand shock. In particular, we try to disentangle the two channels by first building the counterfactual consumption response in the absence of a rise in credit. Then, we build the counterfactual response in the absence of both credit and house price movements. In Figure 4, we plot these two counterfactuals, superimposed on the benchmark response, for the two housing demand shocks.

In the case of a domestic housing demand shock both the collateral and housing wealth channels are operative. In the absence of credit rising, consumption still rises but is always lower compared to the benchmark (top left). In the second scenario (bottom left), the consumption response is virtually flat. With this exercise we illustrate the importance of the two main theoretical channels we are after. To quantify the relative strengths of these two channels, we compute the effect on the long-run cumulative response of consumption in the absence of each of these channels, and report them in Table 2. The collateral and housing wealth channels each contribute about 0.4% to the cumulated response of consumption at a ten year horizon, and jointly explain about 87% of the total consumption response to the domestic housing demand shock. Therefore, not only are the two channels about equally important but they also capture the main driving forces behind the consumption response.

Figure 4

IRFs TO A DOMESTIC HOUSING DEMAND SHOCK

Source: Authors’ calculation.

Notes: The figure shows the median responses across the identified sets and the 68% credible bands, in percentage deviation from the baseline projection. Values on the horizontal axis are quarters following the shock. We normalise the shock to produce a 1% rise in real house prices on impact in both scenarios.
On the other hand, in the case of a foreign housing demand shock the consumption response seems to be driven
by the housing wealth channel, although the absence of a collateral channel could be due to the changing compo-
sition of the population and the absence of mortgage refinancing we discussed above. Indeed, the top right panel
in Figure 4 shows a very similar consumption response in the absence of credit movements, but the bottom right
panel shows a very muted consumption response in the absence of both credit and house prices. In Table 2, we
quantify the relative sizes and find that the housing wealth channel dominates the entire response. The cumulative
impact due to this channel is stronger than in the benchmark response, since consumption in the latter falls in the
first few periods.

“The collateral and housing wealth channels each contribute about 0.4% to the cumulated response of consumption at a ten year horizon, and jointly explain about 87% of the total consumption response to the domestic housing demand shock”

Validating the identified shocks

In this section, we test the information content of the identified housing demand shocks by studying their historical
impact on key observables. Armed with a set of specific events which likely contributed to these shocks, we observe
whether the timing of these events and the contribution of the shocks overlap. We find that most events line up
very well with the shocks we identify. Figure 5 shows the contribution of the two housing demand shocks to growth
in house prices, household credit and consumption, where the latter two are both expressed in per capita terms.
When the shaded area is below the actual data, this implies that the shock contributed positively to the variable in
question, and vice versa. For example, in the beginning of 2011, house price growth would have been around 0%
instead of -5% in the absence of both housing demand shocks.

The earliest event of interest in our sample is the referendum on Malta’s membership of the European Union, which
was held in March 2003, labelled ‘EU ref.’ We view the outcome – which was in favour of EU membership – as con-
tributing to optimism about the economic outlook and development which boosted asset prices, credit and consump-
tion. In fact, the contribution of domestic housing demand shocks to house prices – and to a lesser extent consump-
tion – turned positive in the wake of this event, and the negative contributions to credit started to subside. Malta then
joined the European Union on 1 May 2004, marked ‘EU accession’ in Figure 5. The contribution of domestic housing
demand shocks was the highest in this period, also explaining the rise in credit and consumption per capita. The next
event related to the housing market is a measure announced in the 2008 Budget Speech, effective as from 2007
Q4, which offered an interest rate subsidy for first time buyers of up to 1% on the base rate if this was greater than
3.75% for ten years, and the lower stamp duty of 3.5% on a personal residence worth up to €70,000 was extended
to property valued at up to €116,498. We label this event as ‘interest subsidy’. This measure was meant to stimulate
the property sector, which was experiencing a heavy correction following several years of strong growth. We find that
in this period low housing demand contributed negatively to house price growth, and the measure does not seem to
have had any major influence on house prices, credit and consumption.

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LONG RUN CUMULATIVE IMPACT ON CONSUMPTION</td>
</tr>
<tr>
<td>Per cent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Domestic housing demand</th>
<th>Foreign housing demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.89</td>
<td>0.64</td>
</tr>
<tr>
<td>Collateral channel</td>
<td>0.36</td>
<td>0.02</td>
</tr>
<tr>
<td>Housing wealth channel</td>
<td>0.41</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation.
Note: The table shows the cumulative rise in consumption following a domestic and foreign housing demand shock respectively at a 10-year horizon.
Two other related events that we consider relevant for explaining shocks are the stamp duty reductions for first-time buyers in 2014 and for second-time buyers in 2018 (‘FTB st.duty’ and ‘STB st.duty’ respectively). These two policies reduced the amount of stamp duty that a household incurs upon buying a house, with the former in particular aimed at re-igniting the real estate market following years of subdued activity. These two events coincide with sizeable, positive
contributions of domestic housing demand shocks to house prices. The policy relating to first-time buyers was announced while domestic demand was already strong. However, since we use advertised house prices, we cannot rule out possible anticipation effects behind the rise in house prices prior to 2014. Although this policy was extended every year up to the end of our sample, we do not find strong contributions of housing demand shocks to house prices until the stamp duty refund for second-time buyers was announced. The latter coincides with a reversal from negative to positive contributions to house prices, and we attribute at least part of the rebound in advertised prices at that point in time to this policy.

Another noteworthy event in 2014 was the reduction in tax on rental income from 35% to 15%. This – over and above any other factor that increased supply – likely contributed to the housing sector by boosting the supply of rental properties by increasing the willingness of landlords to put their property on the rental market. Notwithstanding this, our decomposition attributes positive foreign housing demand shocks, which pushed up house prices in this period. As we show in Figure 6, the number of foreign workers was rising at double digit rates in this period, with demand likely outstripping supply and putting further upward pressure on house prices.

Finally, in Figure 6 we focus on the contribution of foreign housing demand shocks to house prices and consumption and plot them on top of the dynamics of foreign workers in Malta. The growth in the number of foreign workers – which evolves differently from total population growth – correlates strongly with the contribution of our identified foreign demand shocks on house prices and consumption, giving us confidence in our identification strategy. In particular, the house price contribution and foreign worker growth fit each other very well in the period 2004-2014, even though in our estimation we divide real variables by the total population – which followed largely different growth dynamics. In the bottom panel, we lag the contribution to consumption by a year since the effect of the foreign housing demand shock takes about this long to take full effect. This contribution also correlates reasonably well with the dynamics of foreign workers, albeit to a lesser extent than house prices. Our results for the contributions of foreign housing demand shocks on the variables in Figure 5 are therefore well explained by the movement in foreign workers over time.

Conclusion

In this article we look at the link between house prices and consumption, motivated by the collateral and housing wealth channels documented in the literature. We use a Bayesian VAR model estimated on Maltese data to study the responses of a set of macroeconomic variables to housing demand shocks. We propose an identification strategy that allows us to disentangle the effects of two housing demand shocks, to capture the potentially different channels through which they might propagate.

We find a positive response of consumption to a domestic housing demand shock, driven equally by both the collateral and housing wealth channels. This is in line with theoretical predictions from DSGE models and empirical evidence from VAR models estimated for other economies. Therefore, the results in this paper also serve as an

![Figure 6: The Foreign Labour Force and Housing Demand Shocks](image-url)
important cross-check on the same theoretical restrictions imposed in MEDSEA-FIN via the collateral constraint. Domestic housing demand shocks contributed significantly to the evolution of house prices, credit and consumption in Malta. Moreover, we also find an important role for foreign housing demand shocks, driven by strong inflows of foreign workers in the Maltese economy, on house prices and consumption.

References


