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The role of housing market in the effectiveness of monetary policy over the Covid-19 era
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ABSTRACT

The efficiency of monetary policy substantially depends on the phase of the housing cycle since house prices are important determinants of banks’ willingness to lend. This paper presents evidence on 31 countries which shows that over the pandemic Covid-19 period, in a regime of a strong housing market, the effects of a monetary expansion are smaller than in a regime of low house prices. The findings are important for central banks which have implemented easing monetary policies responding to the Covid-19 pandemic.

1. Introduction

The literature has established that housing markets can substantially drive business cycles (Iacoviello and Neri, 2010). In a close, but different strand of the literature, there is substantial evidence that the housing market affects the effectiveness of monetary policy. Calza et al. (2013) provide solid evidence that monetary policy gains efficiency when housing loan rates are of a variable-rate type, while Jordà et al. (2020) document that housing credit growth amplifies monetary restraints.

Within this context, housing markets make the monetary policy reaction dependent on the phase of the housing cycle, with this reaction being highly non-linear. This is happening because, first, collateral constraints bind only occasionally, e.g. in low house prices households can face a binding constraint when asking for a loan. In contrast, when house prices are soaring, the value of collateral turns out to be higher than what is required by banks, resulting in cases where the collateral constraint becomes slack. In addition, a bank can decide to grant fewer loans when it plans to de-leverage, but it cannot force borrowers to accelerate their repayments. In that sense, new loans decline sharply, but cannot become negative.

This paper is motivated by the recent work of Bluwstein et al. (2020), who explicitly incorporate any technical difficulties associated with certain realistic features of the housing markets into a quantitative macroeconomic model. More specifically, they successfully estimate a structural macroeconomic model that includes certain non-linearities. The key advantage of their modeling approach is that it offers a quantitative analysis of the housing market-related non-linearities and their relevance for the transmission of monetary policy. They argue that the presence of different identified (housing) regimes has a catalytic impact on the effectiveness of monetary policy, while the transmission of monetary policy is characterized by non-linearities, implying that the effects of monetary policy exhibit strong asymmetries.

The key takeaway from their work is that monetary easing in the US has been less efficient when house prices are high or started falling rapidly. This is relevant in the current pandemic context, when policymakers respond to the Covid-19 shock, at a time when residential property valuations are high in many advanced economies. Their findings give additional support to the view that the housing market should be closely monitored by the monetary authorities, especially since its phases are not perfectly synchronized with the business cycle. For the central bank’s potency to fight a recession, it may matter whether the economy enters it with high or low house prices.

Therefore, the goal of this paper is to use, for the first time in the literature, a sample of 31 countries during the Covid-19 period and to explore the effectiveness of monetary policy to fight the recession due to the pandemic shock after explicitly considering whether house prices are low or high.

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2. Data

The analysis considers data on housing price indexes, industrial production, central bank interest rates, private investments and net exports from 31 countries: Argentina, Armenia, Austria, Brazil, Canada, Chile, China, Finland, France, Germany, Greece, India, Indonesia, Italy, Japan, Latvia, Lithuania, Malta, Mexico, Netherlands, Norway, Peru, Russia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, UK, US. Data are on a monthly basis, spanning the period February 2020 to October 2020. The selected period matches the presence of Covid-19 cases and deaths in the countries under consideration. Table 1 reports certain summary statistics.

| Variables          | Mean | SD  | Min  | Max  |
|--------------------|------|-----|------|------|
| House prices       | 149.15 | 1.84 | 146.73 | 151.86 |
| Industrial production | 109.16 | 9.44 | 88.56 | 119.37 |
| Central bank interest rates | 3.98 | 0.68 | 3.04 | 5.16 |
| Private investments | 133.84 | 4.61 | 128.62 | 142.13 |
| Net exports        | 556,874,455.2 | 33,910,300.2 | 501,911,371.6 | 604,356,999.7 |

Note: SD = standard deviation

3. Methodology

The empirical analysis makes use of the non-linear smooth transition autoregressive panel data model (PSTR), proposed by Teräsvirta (1994) and Jansen and Teräsvirta (1996), to test the effectiveness of monetary policy under two housing prices regimes.

The two regime PSTR model can be represented as:

\[ IP_{it} = a_{11} + a_{12} + b_1 x_{1t} + b_2 IR_{it} F(q_{it}; \gamma, c) + \varepsilon_{it} \quad (1) \]

where \( x_{1t} \) denotes the drivers of industrial production, such as the central bank interest rate, private investments and net exports. \( a_1 \) and \( a_2 \) denote country and time fixed effects, respectively. \( \varepsilon_{it} \) denotes the error term, and the transition function \( F(q_{it}; \gamma, c) \) is a continuous and bounded function of a threshold variable \( q_{it} \), where in our case is house prices. For the structure of the transition function, the logistic function version is used:

\[ F(q_{it}; \gamma, c) = \left[ 1 + \exp(-\gamma \sum_{j=1}^{m} (q_{it} - c_j)) \right]^{-1} \quad (2) \]

where \( c = (c_1, \ldots, c_m) \) is an m dimension vector indicating the location parameters, and \( \gamma \) is the slope parameter that determines the smoothness of the transition. The slope parameter \( \gamma \) shows the slope parameters, and \( \gamma \) is the threshold variable that determines the presence of the two regimes. The method first determines the threshold level of house prices, with values below this level belonging to the low-prices regime, and those above it belonging to the high-prices regime. Then, the estimates are obtained separately in each regime.

4. Empirical analysis

First, to enhance the accuracy of the results, the stationarity of the data should be confirmed. In this (non-linear) framework, the Ucar and Omay (2009) EU test is applied. This test is preferred since the unit root hypothesis due to non-linearity in the series is not rejected. Moreover, it has higher power compared to the linear tests, and can be performed under the presence of cross-sectional dependency. Table 2 shows the panel unit root test results. For each variable, the test is performed up to six lags and the optimal number of lags was determined according to the Akaike Information Criterion (AIC). The findings show that all the variables have a unit root at the level. When the first differences of the relevant variables are obtained, they turned into stationary variables.

Next, for the identification of the PSTR model, the analysis examines whether the transition between regimes is meaningful. In this context, linearity tests are applied. Here, the transition parameter \( \gamma \) or the threshold parameter \( c \) in the transition function is tested to be equal to 0. If the null hypothesis is not rejected, it can be said that the non-linear model is valid. The test results, reported in Table 3, illustrate that the linearity hypothesis is rejected for the HP transition variable. In addition, according to the minimum value of the p value, \( m = 1 \) is selected, and, thus, \( m = 1 \) is used for the function specified in Eq. (2).
Based on the linearity results, Table 4 shows the PSTR model results. The findings illustrate the transition parameter (γ), the threshold parameter (c), the threshold housing prices, and the coefficients of the central bank interest rates across the two regimes. The estimates signify that in both regimes (low vs high house prices) expansionary monetary policy leads to stronger industrial production, but the impact is stronger in the low house prices regimes (the Wald test suggests the presence of asymmetric effects between the two regimes).

### 5. Conclusion

The results of this work show that the Covid-19 pandemic is likely creating challenges for the efficiency of the monetary policy transmission. Macro-prudential policies, i.e. housing finance regulation, could be important in shielding the economy against financial stability risks posed by housing booms Kelly et al. (2017). The 'liquidity-provision' versus the 'loan-generation' trade-off embedded in quantitative easing support measures should also set the right tone for avoiding strong house prices.

### References

Bluwstein, K., Brzoza-Brzezina, M., Gelain, P., Kolasa, M., 2020. Multiperiod loans, occasionally binding constraints, and monetary policy: a quantitative evaluation. J. Money Credit Bank. 52 (7), 1691–1718.

Calza, A., Monacelli, T., Stracca, L., 2013. Housing finance and monetary policy. J. Eur. Econom. Assoc. 11 (1), 101–122.

Iacoviello, M., Neri, S., 2010. Housing market spillovers: evidence from an estimated DSGE model. Am. Econ. J. Macroecon. 2 (2), 125–164.

Jansen, E.S., Teräsvirta, T., 1996. Testing parameter constancy and super exogeneity in econometric equations. Oxf. Bull. Econ. Stat. 58 (4), 735–763.

Jordà, Ò., Schularick, M., Taylor, A., 2020. The effects of quasi-random monetary experiments. J. Monetary Econ. 112, 22–40.

Kelly, R., McCann, F., O’Toole, C., 2017. Credit conditions, macroprudential policy and house prices. European Systemic Risk Board. ESRB Working Paper, No. 36.

Teräsvirta, T., 1994. Specification, estimation, and evaluation of smooth transition autoregressive models. J. Amer. Statist. Assoc. 89 (425), 208–218.

Ucar, N., Omay, T., 2009. Testing for unit root in nonlinear heterogeneous panels. Econom. Lett. 104 (1), 5–8.