DEVELOPİNG A HOUSE PRİCE AT RİSK FRAMEWORK FOR UK

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Abstract: The main goal of this paper is to better understand how to forecast house price dynamics at different parts of the distribution, with corresponding probabilities, at the UK national and sub-national level. We apply quantile regression to derive a measure of house-price-at-risk (HPaR). We fit the forecasted probability density function, in order to derive measures of downside risks and uncertainty. Our main findings are that that since the 1970s, the most important factors for median house price growth have been: GDP growth, stock market growth, mortgage interest rate change, credit-to-GDP gap, transaction growth, as well as exuberance. For the tail of the distribution, we find the key drivers instead to have been: transaction growth, mortgage rate change, credit to GDP gap, financial stress, and exuberance. At the regional level, we find heterogeneous results for the impact of changes in mortgage rates, with supply-inelastic regions having more reactive house price growth.

***Keywords*:** house price dynamics, financial stability, quantile regression, sub-national house price growth

INTRODUCTION

Shocks originating in housing markets can materially affect real economic activity, especially when property investment is highly leveraged, as was the case in the 2008 Global Financial Crisis. Housing market developments are important for banks, households and firms, as housing is a long-term investment, and mortgages are one of the largest items on the balance sheets of both UK lenders and households (Peydró et al., 2023). The main goal of this paper is to better understand how to forecast house price dynamics at different parts of the distribution, with corresponding probabilities, at the UK national and sub-national level. It is important to gauge the downside risks to future house prices and what this means for financial stability, in part as economies globally have in recent years entered an era of higher interest rates and given the importance of housing market developments for financial stability.

METHODOLOGY

We apply quantile regression (Koenker, 2005) to derive a measure of house-price-at-risk (HPaR) both on a national and sub-national level. We can capture a different sensitivity of the price growth density function to changes in explanatory variables such as interest rates, income, debt burden dynamics, supply side constraints, and financial conditions among others. Furthermore, we will fit the forecasted probability density function (Azzalini and Capitanio, 2003), in order to derive measures of downside risks and uncertainty. Finally, we will apply this framework within stress testing approach, to evaluate the possible paths of house price dynamics based on different simulated shocks.

FINDINGS

Main contributions of this paper are several. Firstly, we collect a great number of possible variables and indicators that could affect house price growth from the supply, demand, financial, nonfundamental, and other point of view. We examine around 50 different indicators, which makes it the most comprehensive list in house price modelling literature. The majority of existing studies focus on one of the categories to understand their contributions to house price movements. Here, we give a fair shot to all of different factors, based on literature and data availability, and reduce the omitted variable bias. It enables us to capture complexity and better understand how different factors affect house prices (Muellbauer et al., 2021), and it improves the accuracy of the model. On top of that, we aimed to collect as longest time series possible, in order to capture several boom-bust periods to learn from different types of housing cycles. Some of the variables that we test start in mid 1950s and onward for the national, and mid 1970s for sub-national level. Secondly, some of the indicators we derive for the first time in literature, as we

define supply misalignment on the sub-national level. We derive them from few approaches. Initially, we estimated models that explain how the housing supply and demand should behave based on macroeconomic fundamentals. Afterwards, we utilise statistical filters to compare the observed values to the one determined as long-term trends. The results we obtain on sub-national level makes sense and can describe some of the stylised facts, and this is important to consider when analysing regional housing markets. Thirdly, this is the first empirical analysis of both aggregate and sub-national level with the at-risk approach. We decompose house price dynamics not only across different regions, but at different parts of growth distribution. Thus, we are able to capture the heterogeneous effects of different variables across the house price growth distribution, and regions. We already mentioned importance of analysing the tail risks so we add importance of regional analysis: it can capture local market dynamics, it enables targeted policy making that can be more effective, helps in investment decisions of private investors and developers, and can feed into better tracking of regional economic development. Finally, we perform stress testing scenario application within our framework, based on publicly available Bank of England scenario (BoE, 2022), to show what is the conditional path of house price growth in different scenarios (stressed and baseline). Both central bank and regulated banks use house price forecasts in their stress tests to evaluate potential losses. Thus, having heterogeneous forecasts could result in different estimates compared to using only one path. Since in the main results we determine heterogeneous results exist, this would show in the stress test application that vulnerabilities that can drive risk are different. This has the potential to help inform the calibration of the stress testing and would provide richer results.

Main results show that most important factors for median house price growth are GDP growth, exuberance, stock market growth, mortgage interest rate change, credit to GDP gap, and transaction growth since 1970s. For the tail risk we also find exuberance, transaction growth, and mortgage rate change to be important. But on top of that credit to GDP gap, and financial stress are also driving the results. We also show that the key drivers of historical house price falls have been different over the decades. We are able to decompose tail risks of different house price declines (early 1980s, 1990s, GFC and recent decline) with respect to different contributors. Whereas the crises of early 80s and 90s were explained via oil price shocks, economic recession, and credit dynamics; GFC dynamics could have been anticipated with the previous drop of transaction growth, jump of financial stress, drop of exuberance and credit dynamics. The latest house price drop during monetary policy tightening period can be decomposed into transaction growth drop, business confidence decline, and mortgage rate increase, alongside low exuberance, and spike of financial stress. On the sub-national level, we find different effects of mortgage rate dynamics, with supply inelastic regions having more reactive house price growth. In regions that are supply inelastic, interest rate increases could be followed by greater price drops, as in the short-term, the supply cannot change, whereas the more expensive cost of borrowing disincentivises demand. In the case of interest rates going down, prices go up in more supply inelastic regions, as the new built cannot take place quickly. Moreover, we find that housing supply growth in the majority of cases helps to alleviate price pressures on sub-national markets. Finally, results of the stress testing exercise show how that there exist regional differences in house price development over a stressed scenario, that could lead to different impairment estimates when compared to using only national-level approach.

CONCLUSIONS

From a monetary policy perspective, the impact of changes in interest rates was found to be important, by changing mortgage borrowing costs and housing wealth. Insights from sub-national analysis also shows that the sensitivity of house price developments with respect to changes in mortgage rates differs across regions. The framework developed in this paper can be used for macroprudential policy's regular risk monitoring purposes. The Bank of England's FPC (Financial Policy Committee) tracks the expansion of credit and developments in asset prices, including equity and house prices, to evaluate the position of where the system stands in the financial cycle. Next, this framework gives us an ability to assess risks and the build-up of vulnerabilities in house prices that are driven by macro-financial indicators. We find that if house price growth is driven by excessive credit activity, there could be room for macroprudential policy to moderate that activity to reduce tail risks. More indebted households are less resilient to negative financial shocks. The framework in this paper can thus be used to predict risks from a build-up of

debt supported by house price growth. Another implication for macroprudential policy is found in stress testing. Authorities could use these models to project different paths of house prices in a stressed scenario for the UK regions, in order to better capture risks across different regions and potential losses on banks' mortgage loan books.

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