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Regional house price cycles in the UK, 1978-2012: A Markov switching VAR approach

Abstract

There is an extensive literature on UK regional house price dynamics, yet empirical work focusing on the duration and magnitude of regional housing cycles has received little attention. This paper employs Markov Switching Vector auto regression (MSVAR) methods to examine UK house price cycles in UK regions at NUTS1 level. The research findings indicate that the regional structure of the UK house market is best described as two large groups of regions with marked differences in the amplitude and duration of the cyclical regimes between the two groups. These differences have implications for the design of both macroeconomic and housing sector policies.

1. Introduction

Charles Kindelberger (1978) observed that two key features of financial crashes are that they are much more frequent than recognised and that their effects are forgotten with the onset of the next upswing (Maclennan and O'Sullivan, 2011). Governments and scholars alike have shown an interest in learning from the global financial crash of 2007-8 and the recessions and austerities it fashioned. Housing markets and cyclical instabilities lay at the heart of the causes and consequences of the crash, not least in the UK. This paper seeks to improve our understanding of house price cycles in the UK so that there may be better knowledge of the past and an enhanced assessment of what future upswings and downswings might entail.

The bursting of the apparent housing bubble after 2007 had a significant impact on house prices all over the UK. Recent evidence shows that the severity and the magnitude of the drop in house prices varied across regions. Equally, since 2012 the recovery of house prices in the South East and London has already started to take place whereas in other parts of UK such as Northern Ireland, prices were still falling or stagnant towards the end of 2013, before showing signs of modest recovery by mid-2014. This regionally distinct pattern in the growth rate of house prices has long been evident (McAvinchey and Maclennan, 1982; Hamnett, 1988; Holmans, 1990; Meen, 1999) and was especially noticeable during the recessions of the late 1980's and early 1990's.

Although there is an extensive literature on UK regional house price dynamics it largely focuses on the 'ripple effect' and inter-regional house price convergence. However, to fully understand the varied patterns in house prices that prevail across UK regions and to better align macroeconomic policy with more localised market conditions there remains much to understand about the magnitude and duration of these cycles. This paper, using Markov

switching models proposed by Hamilton (1989) analyses regional house price cycles in the UK for the period of 1978 to 2012.

This paper contributes to the existing literature in three ways. First by employing a Markov switching vector auto regression model (MSVAR) for each region the asymmetric growth patterns of regional house prices at different points on the cycle can be observed. Rather than using a two state Markov switching model that is normally seen in the business cycle literature this study uses a three state model that better suits the data. Second we analyse the duration of the regimes across region and over time. Finally the smoothed probabilities of the regimes obtained from the MSVAR are used to compare central events/episodes in the sample period across regions and this allows a focus on the disparities caused by regional and national factors.

The paper is organized as follows. The next section provides a brief theoretical background and literature review for the study. Section three discusses the data and the econometric methodology. Results are discussed in section four, followed by section five which focuses on the factors affecting regional house price cycles and some final conclusions are presented in section six.

2.   Theoretical background and literature review

Work done by McAvinchey and Maclennan (1982), Maclennan, Gibb and More (1994), Muellbauer and Murphy (1997) and Munro and Tu (1996a, 1996b) has already established that house prices across UK regions vary due to disparities in regional housing market structure, regional economic structure and performance and also due to locational characteristics. Furthermore, nationally homogeneous government housing and monetary policies can also magnify the disparities among regional house prices (Maclennan *et al.*,

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1994; Dow & Montagnoli, 2007). Meen (1999) notes that regional house price movements can be decomposed into three components: (1) movements that are common to all regions, (2) variations that are due to the regressors, reflecting differences in economic growth between regions and (3) structural differences in regional housing markets, captured by spatial coefficient heterogeneity. The last of these three components primarily explains variations in regional house prices in the short run while the first two mainly explain long run movements in regional house prices.

Researchers have also pointed out some persistent key features that can be observed in UK regional housing data. First, house price differences between the northern and southern regions of the UK widen during economic booms and narrows during economic recessions. Secondly, London and the South East appear to lead the house price cycle and its downswing is greater than elsewhere. Finally, in the long run, a constant set of regional price relativities appear to exist.[1]

The propensity of house prices to rise first in the London/South East during an upswing and then diffuse outwards, in a broadly south to north pattern, is known as the 'ripple effect' and is mainly a short run phenomenon. Early papers by Alexander & Borrow (1994), Mac Donald & Taylor (1993), and later research by Meen (1999), Wood (2003) confirm the findings of the 'ripple effect'. The possible causes of the 'ripple effect' can be attributed to spatial spill-overs (caused by migration, equity transfer, spatial arbitrage and spatial patterns in the determinants of house prices) and may also arise from structural differences in regional housing markets. Meen (1999) using simulations, shows that even when regional variables grow at the same rate national shocks[2] on regional house prices can create 'ripple effects' which can only be explained by regional differences in regional housing market structures.

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[1]   See Holmans (1990), Meen (1999) and Cook (2012)
[2]   These are national changes such as changes in unemployment

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This emphasises the importance of structural differences in regional housing markets relative to spatial spill-over processes in explaining price ripple effects. The existence of the ripple effect also implies that housing cycles will be different across regions. In addition to this, the duration of the regimes in a cycle may also vary, depending on both the type of the exogenous shock and regional market characteristics.

While the 'ripple effect' is mainly a short term feature[3] of the housing market, convergence theory suggests that inter-regional house price relativities are likely to return to some long term norm. Convergence theory states that whilst the ratio of house prices in different regions may diverge from historic norms in the short run, a long run relative equilibrium price exists, and will be restored in the long run. The notion of regional house price convergence has its roots in equilibrium growth model theories.

According to neoclassical growth theory income across regions will converge in the long run indicating that regional house prices may also converge in the long run. However, one of the criticisms of these models is the assumption of unrestricted mobility of factors among regions. There is a well-developed literature on the role of wages on house prices in allocating workers to different regions that suggests this reasoning may be too simplistic. For example, Roback (1982) developed a model in which local amenities affect the equilibrium and introduce ambiguity into the relationship between wages and rents for a given location. In Roback's model with all else equal, labour prefers amenities and the migration of labour into higher 'quality' locations puts upward pressure on rents in these regions. Firms for whom these amenities are unproductive seek to reduce cost by locating to less amenable areas. Thus, less competition for land due to firm migration tends to offset the upward pressure on rents from labour migration, rendering ambiguous net effect of amenities on

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[3] Since ripple effect shocks revert back to the steady state and hence it would be logical to think that these shocks are transitory rather than permanent shocks.

rents. In addition most of the empirical studies on UK do not find any strong evidence of income convergence implying that house price convergence may be incomplete.[4] In fact, the empirical evidence of regional house price convergence is quite mixed. Recent studies by Cook (2003, 2012) only exhibit signs of β-convergence in economic downturns.[5]

Studies of 'ripple effect' and convergence theory either focus on the movement of absolute house prices or the growth rates of prices across space and time. Moreover, with a few exceptions, most of the studies examining the magnitude of the growth rate tend to assume linearity and this is unduly restrictive.[6] Regional house price outcomes clearly reflect national and international shocks that differentially impact regions with different structural and locational characteristics. However, they also reflect the consequent impact of such effects on inter-regional trade and growth within the national system and; this is likely to be non-uniform in housing markets characterised by locationally fixed capital. The existence of such spatial fixities mean that economic systems have key local as well as regional, national and international dimensions. It is also not clear, given changing patterns of regional advantage in production, why there should be long run constancy in regional relative house prices. More probably, given the regional disparities that exist across UK regions a shock is likely to have dissimilar effects on the timing, and magnitudes of regional house price growth rates and hence on the duration of the cycle across the regions.

Clarke and Coggin (2009), using unobserved components model, examined United States regional housing cycles. The use of an unobserved components model enables analyse not only of long run trends in regional house price data but also cycles. Their results reveal that

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[4]   See McGuinness & Sheean (1998) and Chattarji & Dewhurst (1996).

[5]   β convergence, refers to the notion of series with lower (higher) initial values experiencing faster (slower) growth than series with higher (lower) initial values. According to β-convergence house price in periphery regions will grow faster than house price in core regions.

[6]   See Cook (2003).

for regional house price cycles the US can be decomposed into two major groups of regions with distinct, different housing cycles. Their pioneering work does, however, use linear trend models in a context of non-linear data. An alternative way of looking at house price cycles, where data may be non-linear, is to use regime switching models. Hall, Psaradakis and Sola (1997) and Garino and Sarno (2004) have employed Markov switching models to estimate UK's house price cycles at the national scale. More recently, Tsai, Chen and Tai Ma (2010) use Markov switching ARCH models to examine volatility of house prices in different segments of the UK housing market. Markov switching VAR and regime dependent impulse response functions have also been used by Simo-Kenge *et. al.* (2013) to analyse the South African housing market and how they react to South African monetary policy during boom and bust periods.

3. Data and Methodology

In the UK regional house price data are available from government sources and from two major mortgage lenders, Halifax and Nationwide. In line with most recent, comparable research (Cook 2003, 2012) we use Nationwide seasonally adjusted regional house price index for our empirical work.[7]. The data frequency is quarterly and the period analysed starts from the second quarter of 1978 and ends in the third quarter of 2012. Because of stationarity issues, growth rates in house prices rather than house price levels are the focus of the analysis below. Augmented Dickey-Fuller (ADF) unit root test were undertaken for the growth rate of house prices. Results show all the series reject the null of nonstationarity at the 5% level of significance.[8] [9]

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[7]   It would be more preferable to use regional house price data deflated by regional price levels but, the lack of UK regional price level data forces to use of the published house price index. Deflating each regions house price with national price level will lead to same proportional change in all regional house price series and hence it is unlike to change the obtained results.

[8]   Results can be provided on request

Most papers examining house price cycles either use structural time series techniques or Markov switching models. Each method has its own merits and limitations. Empirical work using unobserved components modelling frameworks tend to assume linear trends and this is a major shortcoming of these studies.

Markov switching models involve multiple structures (equations) that can characterise the time series behaviours in different regimes. By permitting switching between these structures, this model is able to capture more complex dynamic patterns. A novel feature of the Markov switching model is that the switching mechanism is controlled by an unobservable state variable that follows a first order Markov chain. In particular, the Markovian property regulates that the current value of the state variable depends on its immediate past values. As such, a structure may prevail for a random period of time, and it will be replaced by another structure when a switching takes place. The Markov switching model also differs from the models of structural changes in the sense that it allows for frequent changes at random time points and thus making the Markov switching model more suitable for describing correlated data that exhibits distinct, different dynamic patterns during different time periods. In our estimation framework the Markov switching vector auto regression (MSVAR) can be written in the following form;

$$hp_t - \mu_{s_t} = \Phi\left(hp_{t-1} - \mu_{S_{t-1}}\right) + \cdots + \Phi\left(hp_{t-p} - \mu_{S_{t-p}}\right) + \varepsilon_{s_t} \tag{1}$$

where, hp_t represent the growth rate in house price, $S_t = \{1,2,3\}$, represents the state variable. S_t is governed by the Markov chain with transition probabilities $Pr[S_t = j | S_{t-1} = i] = p_{ij}$. μ_{s_t}, represents the average growth rate in regime S_t. The MSVARs are estimated using Maximum likelihood procedure.

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[9] One reason why regional house price series may contain unit roots can be due to structural breaks in the data caused by changes in monetary policy, economic growth or capital inflow. Perron (1989) finds unaccounted breaks in the data can reduce the power of ADF tests. Recently Cook and Vougas (2009) using smooth transition momentum threshold autoregression (ST-MTAR) find UK house prices are actually stationary with breaks.

One of the special characteristics of regional data is spatial autocorrelations which are usually caused by spatial spill over effects. Spatial regression models are used to capture these effects.[10] Such effects could also be captured in a multivariate VAR setting, where all the variables are kept endogenous. However, in the research reported below a multivariate Markov switching VAR could not be estimated due to a degrees of freedom problem.

In order to reduce the dimensionality of the data and check for common factors, we performed a principal-component factor analysis (PCF), with communalities and a varimax rotation (principal axis factor rotation). This is a standard method of factor analysis for data reduction and has been widely used to examine club convergence (Clark and Coggin, 2009).[11] [12] The use of principal-component factor analysis on the twelve regions allows us to discover the formation of smaller subgroups of regions and identify their time series properties.

4. Results

The section first presents the results of the principal-component factor analysis and then discusses the results of MSVARs.

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[10]   See more for Anselin (2010)
[11]   See Harman, 1976
[12]   It should be noted here we are using Principle components factor analysis (PCF) rather than Principal components analysis (PCA). Although both are used to reduce the dimension of the data there is difference among the two. The former analysis method finds a few common factors (say, q of them) that linearly reconstruct the p original variables,
$$y_{ij} = z_{i1}b_{1j} + z_{i2}b_{2j} \dots \dots + z_{iq}b_{qj} + e_{ij}$$
where, y_{ij} is the value of the ith observation on the jth variable, z_{ik} is the ith observation on the kth common factor, b_{kj} is the set of linear coefficients called factor loadings, e_{ij} is similar to a residual but is known as the jth variable's unique factor. In the PCA the leading eigenvectors from eigen decomposition of the correlation or covariance matrix of the variables describe a series of uncorrelated linear combinations of the variables that contain most of the variances.

Table 1 presents the results from the principal component analysis which shows the twelve regions can be amalgamated into two super-regional factors.[13] Factor 1 corresponds to Super-Region One (SR1) and includes London, Outer Metropolitan, Outer-East, East Anglia, South West, East Midlands and West Midlands. The second factor corresponds to Super Region Two (SR2) and includes Scotland, Northern Ireland, the North, Wales and Yorkshire and Humber. These results, suggest a well-defined North-South split. The results should be treated with caution as close inspection suggests that Northern Ireland's uniqueness (uniqueness is the percentage of variation that is not explained by the common factors)[14] is high.[15] However, eigenvalues presented in Table 1A and using Kisers criterion (which suggests retaining factors with eigenvalues greater than 1) it can be reasonably accepted that the decision of considering two super groups in the data is correct.

Table 1: Rotated Factor loadings

Variable	Factor 1	Factor 2	Uniqueness
Scotland	0.150	0.846	0.260
Northern Ireland	0.197	0.449	0.458
North	0.3201	0.856	0.164
Yorkshire and Humber	0.480	0.742	0.218
London	0.870	0.190	0.205
Outer East	0.932	0.256	0.164
East Anglia	0.875	0.224	0.182
South West	0.870	0.325	0.137
East Midland	0.728	0.508	0.211
West Midland	0.695	0.473	0.294
Wales	0.528	0.655	0.303
Outer Metropolitan	0.889	0.254	0.144

4.1. *Results of Markov switching model*

This section discusses the results obtained from the MSVAR for each region. Table 2 and Table 3 present the average growth rates of house prices in different regimes/states, the transitory probabilities and the average durations of the regimes in each region (regression

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[13] See Table1A and Table1B for eigenvalues

[14] See more in Harman, 1976

[15] There are some characteristics that make Northern Ireland's house price dynamics unique from other regions. For example the amount of violence and peace treaties play a important role in house price movement in Northern Ireland (see Basley and Mueller, 2009). Republic of Ireland business cycles also influence Northern Ireland house prices.

results of the regions corresponding to SR1 and SR2 are presented in Tables 2 and 3 respectively). [16]

While coefficients of a MSVAR may be significantly different from zero, there is always a probability that within a region, the regimes may not be statistically different from each other. Hence, Wald tests were undertaken to examine whether mean house price growth rates in different regimes are different from each other within each region. P values of the tests are reported in Table 2A and 2B. The results suggest the three house price growth rate regimes are indeed statistically different from each other within a region.

Results from Table 2 and Table 3 illustrate that the fall in house prices was faster in SR1 than in SR2. In SR1 the fall was highest in East Midlands (-3.82%), followed by East Anglia and the Outer East. When comparing the growth rate of house prices in medium and high states it is evident that regions in SR1 grow at a faster rate than regions in SR2. For SR1, in the medium growth state the average growth rate is the highest in London, (2.8% per quarter) followed by South West, Outer East and East Anglia. In SR2, Northern Ireland has the lowest growth rate both in medium and high growth rate regime.

The average duration of the low growth regime in both SR1 and SR2 are similar. The low growth regime has the shortest duration in East Midlands followed by London. At the other extreme the average duration of the low growth regime is the longest in Northern Ireland, about 10 quarters. When comparing the average duration of positive growth rate regimes (sum of medium and low growth rate regime) it is evident that the durations are much longer in SR1 compared to SR2.

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[16]   We estimate average duration of every state by $\frac{1}{1 - p_{ii}}$

Table 2: Average growth and duration of regimes of Super region one

	London	Outer East	S. West	East Anglia	E. Midland	W. Midland	Outer Metropolitan
Average growth rates							
Low	-1.270*	-2.903***	-0.211	-3.40***	-3.82**	-0.460	-0.270*
Medium	2.770***	1.900***	1.956***	1.84***	1.01**	1.121**	0.751*
High	5.027***	6.025***	6.191***	6.042***	3.67**	4.441**	3.751***
Transitory probabilities							
P(1,1)	0.774**	0.842**	0.890**	0.874**	0.750**	0.871**	0.880**
P(2,2)	0.903**	0.906**	0.877**	.937**	0.916**	0.843**	0.914**
P(1,3)	0.053	-0.000	0.035	0.060	0.040	0.000	0.101*
P(2,3)	0.088	0.200	0.060	0.094	0.090	0.135	-0.000
Average duration							
Low	4.424	6.329	9.090	7.936	4.000	7.692	9.333
Medium	10.310	10.640	8.130	15.870	11.90	6.369	11.627
High	7.100	5.000	10.526	6.500	7.690	7.407	9.900

Note: *** represent 1% level of significance, ** represent 5% level of significance and * represent 10% level of significance.

Table 3: Average growth and duration of regimes of Super region two

	Scotland	Wales	North	Y & H	Northern Ireland
Average growth rate					
Low	-0.193*	-1.152	-0.281*	-0.691*	-1.918*
Medium	1.895**	1.212**	1.240***	1.289***	0.900**
High	5.349**	4.995**	5.400***	3.348***	3.022**
Transitory probability					
P(1,1)	0.842**	0.784**	0.812**	0.840**	0.895**
P(2,2)	0.868**	0.908***	0.861**	0.863**	0.935**
P((1,3)	.086*	0.000	0.095	0.000	0.093
P(2,3)	0.047	0.167	0.099	.163*	0.138
Average duration					
Low	6.329	4.629	5.319	6.250	9.523
Medium	7.575	10.869	7.194	7.299	15.384
High	7.518	5.988	5.154	6.134	4.329

Note: *** represent 1% level of significance, ** represent 5% level of significance and * represent 10% level of significance.

The robustness of these findings and an alternative was checked by equation 1 is estimating using constructed house price series for SR1 and SR2. The house price series for the two super regions is constructed using the rotated factor loadings from Table1. HP1 and HP2 are the house price series of SR1 and SR2 respectively and are constructed in the following way;

$$HP1 = 0.150(Scotland) + 0.197(Northern\ Ireland) + 0.321(North)$$
$$+ 0.48(Yorkshire\ and\ Humber) + 0.87(London) + 0.932(Outer\ East)$$
$$+ .875(East\ Anglia) + 0.870(South\ West) + 0.728(East\ Midlands)$$
$$+ 0.695(West\ Midlands) + 0.528(Wales) + 0.889(Outer\ Metropolitan)$$

$$HP2 = 0.846(Scotland) + 0.449(Nothern\ Ireland) + 0.856(North)$$
$$+ 0.742(Yorkshire\ and\ Humber) + 0.190(London)$$
$$+ 0.256(Outer\ East) + 0.224(East\ Anglia) + 0.325(South\ West)$$
$$+ 0.508(East\ Midlands) + 0.473(West\ Midlands) + 0.655(Wales)$$
$$+ 0.889(Outer\ Metropolitan)$$

Results presented in Table 3A show average house price growth is higher in medium and high growth phases in SR1 compared to SR2. Moreover, in low growth phases house prices drop sharper in SR1 compared to SR2. These results are similar to our earlier findings from Tables 2 and Tab 3.

5. Factors behind regional housing cycles

It becomes apparent from the results that there are significant differences in both growth rates and average regime durations for the groups. Much of this variation can be attributed to the existence of regional heterogeneities in housing markets, financial sectors and labour markets. In consequence national policies/shocks exacerbate the magnitude and duration of the cycles. Here we explain how the interaction of these two factors and the factors themselves alone affect regional house cycles.

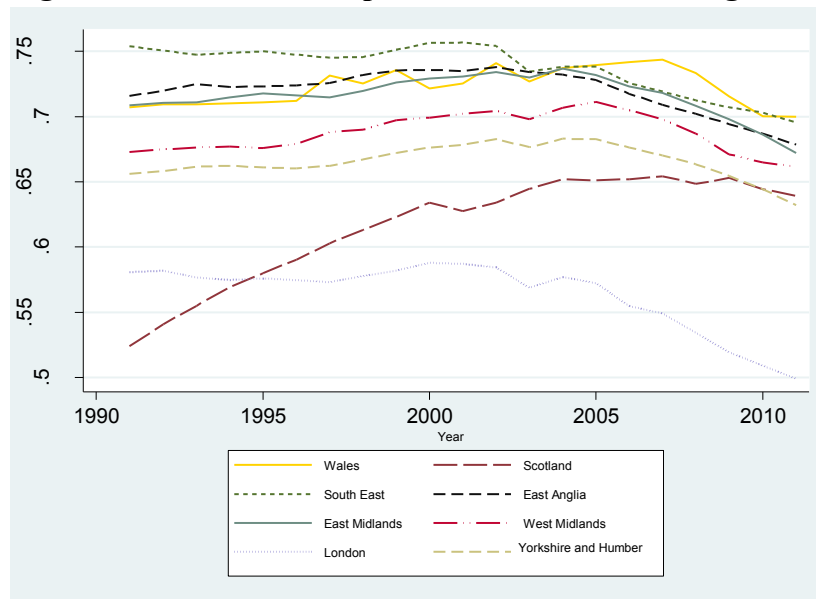### 5.1   Monetary policy and the regional housing market

Firstly, the role played by monetary policy on regional house price growth is significant. Changes in monetary policy can have heterogeneous effect on regional house price dynamics which may be transmitted through the different transmission channels, such as the traditional Keynesian interest rate channel as well as credit channels (bank lending channel, balance

sheet channel). McAvinchey and Maclennan (1982) show that changes in mortgage rate have heterogeneous effects on regional house prices (being insignificant in Scotland and highly significant in the South East). Meen (1999) also states that debt gearing capacity in the South East and Southern region of UK are higher than in other parts of UK and thus these regions face a greater risk of encountering short term liquidity constraint during periods of rising interest rates. As a consequence households in the South East and South are more responsive to interest rate changes than other regions of the UK. In addition to this, Maclennan, Gibb and More (1994) show that home ownership rates vary across regions in the UK, being relatively low in Scotland and North compared to South and Midlands. Moreover, Maclennan *et al*. (1994) also show that the private renting sector is proportionately more significant in the South than in other regions. Although, it is evident from Fig1a that there has been a significant increase in home ownership in Scotland, the proportion is still below that of South East and the Midlands. Given more or less an inelastic supply curve these two points help us explain why house price will tend to respond earlier and faster in the South and South East compared to other regions after a drop in interest rates. In addition, it should be noted that the absolute amount of equity injection made during house purchase is also higher in South which also assists the faster growth in house prices.[17]

In support of our statement we make use of the smoothed probabilities of the high growth regimes obtained from the MSVARs. After analysing the smoothed probabilities in Fig 2a and Fig 2b it becomes apparent that the interest drop in the mid 1980's had a larger and a more prolonged impact on house price increase in the South East than the other parts of UK. Moreover, it is evident from the figures that the effect of interest rate drops on house prices in south eastern regions were felt earlier than in to other parts of UK.

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[17]   See Maclennan *et al*. (1994)

Fig1: Ratio of owner occupied houses to total housing stock

5.2   *Monetary policy and regional labour market*

If the UK has region specific Philips curves then the impact of monetary policy changes will vary across regions and hence it is plausible to believe the impact on housing markets will also vary. The correlation between wage inflation and the unemployment rate are smaller in SR1 than for SR2. For example, the correlations between wages and unemployment rates in Scotland, Wales and Northern Ireland are -0.287, -0.182 and -0.0706 respectively, where as in London it is -0.504 and -0.480 in South East. Thus for a given unemployment rate a drop in the interest rate will tend to increase income more in the South Eastern regions than other parts of UK. Consequently, rises in house price will tend to be sharper in SR1 especially in the South Eastern regions after a monetary policy change.

*5.3   Monetary policy and regional banking sector*

The impact of changes in monetary policy on house prices can also be transmitted through bank centred transmission channels such as the bank lending channel and the bank capital channel as some local banks may be more interest sensitive than others in terms of credit supply.[18] Financial liberalisation and innovation, such as the spread of mortgage loan securitisation, may reduce the impact of changes in monetary policy on bank loan supply in normal times. However, the pro-cyclic nature of these instruments also amplifies the negative shocks during economic downturns.[19] In addition, the risk associated with borrowers varies across regions mainly due to structures of the local economy. This makes banks' loan supply heterogeneous across regions and forces them to react differently to interest rate changes and to economic shocks making the impact on the housing sector dissimilar across regions.

More recently, since the financial crisis of 2008 expansionary monetary policy was pursued by the Bank of England to increase economic activity. The extra debt carrying capacity and the low interest rates that then prevailed during this period might be one of the reasons why the recovery of house prices was faster in the South East than in other regions of the UK. However, it should be noted that the inflow of foreign capital into the real estate sector has been much more pronounced in the South East and London than in other regions and has helped the market to revive. The relatively faster recovery of the South East compared to other regions can be seen in Fig 3a and Fig 3b which presents the smoothed probabilities of medium growth regime

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[18]   See Heuvel (2012), Ashcraft (2006)
[19]   See Altunbas, Gambacorta and Marques (2007)

Fig 2a: Effect of 1980's interest drop on drop on House prices (smoothed probabilities of h

East Anglia

Outer East

East Midlands

South V
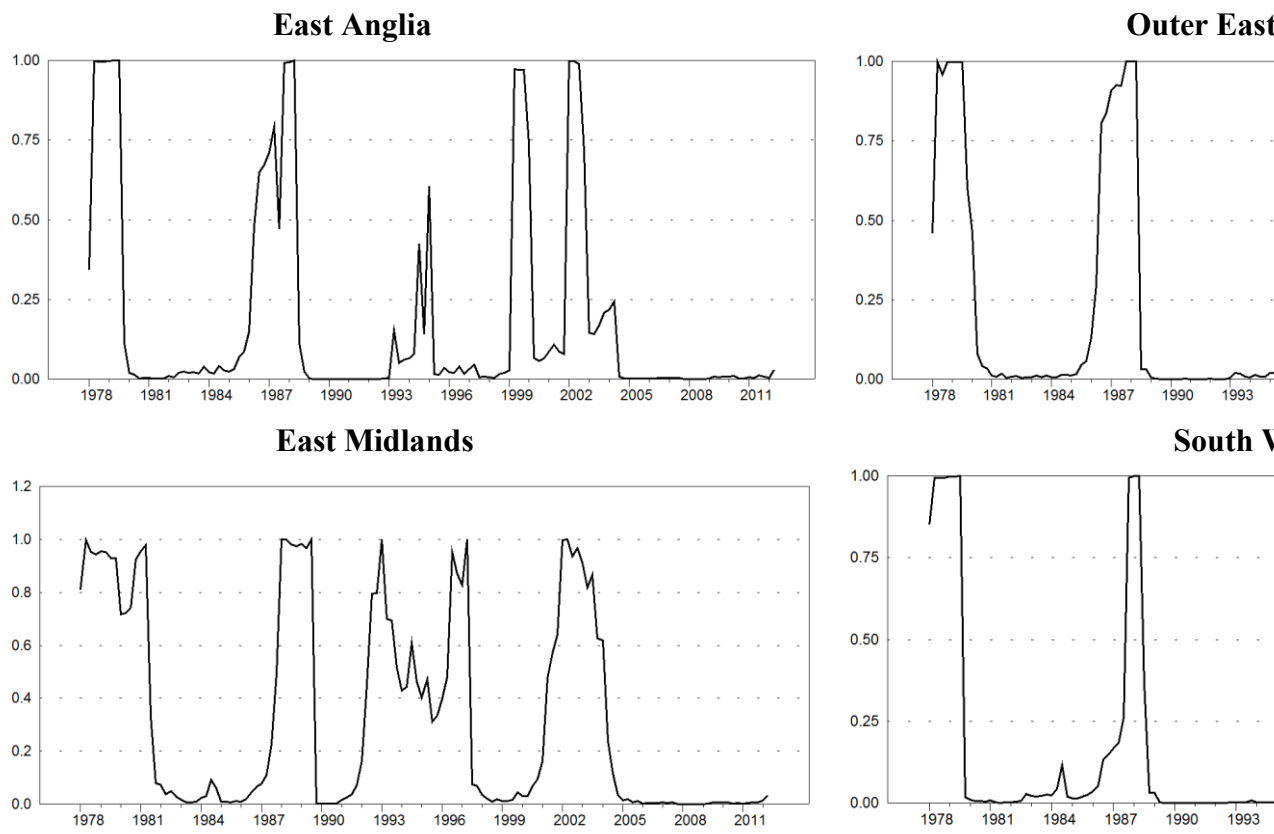
Note: Probability, *p=1* shows the regime is in high growth rate state

Fig 2b: Effect of 1980's interest drop on drop on House prices (smoothed probabilities of hig

Yorkshire & Humber

North

Scotland

Wal
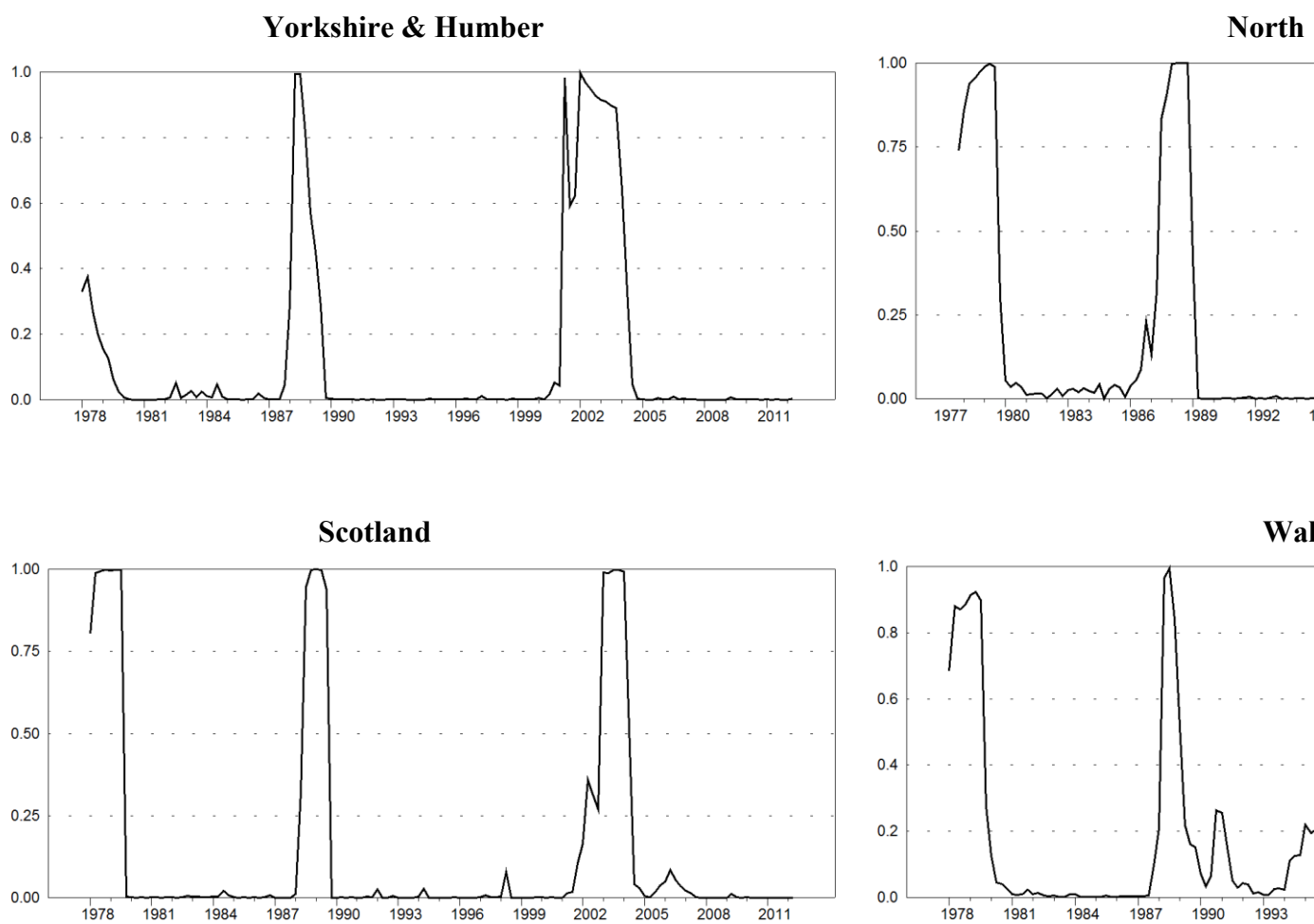
Note: Probability, *p=1* shows the regime is in high growth rate state

5.4   Regional housing market structure

The structure of the regional housing market also plays an important role in shaping the growth pattern and the duration of the regimes. One of the reasons why house prices respond faster in the South East and London may be due to a more sophisticated and liquid market (in the sense that information is reflected more rapidly in house prices there). Turnover, measured by the ratio of number of owner occupied property transactions to owner occupied housing stock is the highest in London and the South East which could mean that information relevant to house prices prospects is reflected more quickly in prices there.[20] However, the speed of response of house prices also depends on the spare housing capacity in the region. Increased demand could lead prices to rise faster and sharper in regions where there are fewer vacant properties as there will be an immediate absence of spare capacity in such regions to soak up the increased demand. Fig. 4 plots show the relationship between mean vacant dwelling stocks and the average house price growth rate in the high growth regime and the correlation coefficient between the two is -0.286.

Fig 4: Relationship between vacant dwelling stock and average house price growth rate in high growth regime
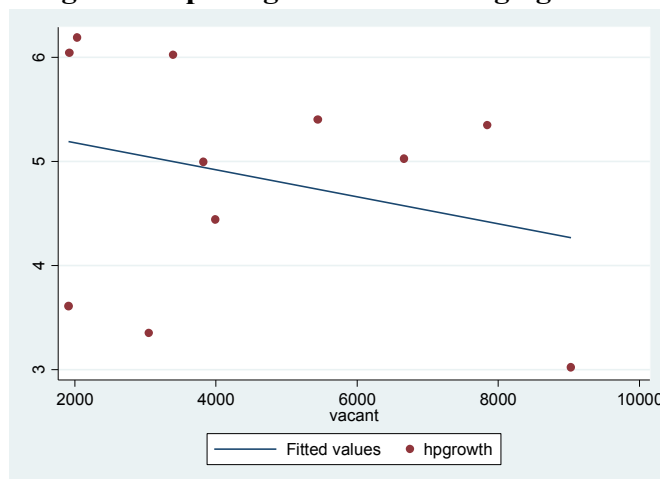
Increases in house prices as a result of excess demand arising from any mismatch between demand and available supply should encourage new construction, which should then, with a

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[20]   See Wood (2004) for more.

lag dampen any new initial price response to a change in demand. However, evidence provided by Meen (1996) shows that it is difficult to expand the housing stock quickly in the South East compared to other regions, possibly due to planning restrictions. This may be one reason why house price growth is more persistent and the duration of positive growth regimes much longer in the East and South East regions.

5.5   *Government Housing policy*

Housing markets typically display regional and local heterogeneity as shocks, demands, supply systems and policy responses have strong local dimensions. Some of this heterogeneity is short term. However, the findings set out above emphasises that there are substantial, long term differences in the timing, amplitude and duration of house price cycles across broad group of regions. There is a pronounced north-south geography to these differences so that the meso-structure of housing markets that emerges presents a challenge to the effective design of fiscal and monetary policies to achieve macroeconomic goals. Nationwide instruments may have different effects on different meso-regions when their housing markets are behaving differently.

Significant differences in housing policies involving public expenditure and regulatory framework across the developed administrations of the UK may also intervene between national policy change and local, regional effects. For national policy instruments to have real effectiveness there has to be some regard to the differentiated nature of the essentially local and regional housing markets of the UK.

Recent experience in the UK illustrates the policy design problem. After 2011 government took the view that static house prices, slow sales and record low levels of new construction were slowing recovery. In the Budget for 2013 the Government introduced a nationally uniform Help to Buy policy. In the following year (to mid-2014) UK house prices have risen by 4.7 percent, but London and South-East, at the core of Super Region 1 have seen prices

rise by 17 percent whilst Northern region prices have risen by 3 percent. The Government has been criticised for promoting national demand side stimulus when supply was minimal and for driving a London price boom. Undoubtedly in SR1, with higher debt gearing capacity and prevailing low interest rates, the loosening of credit rationing constraints via the Help to Buy scheme has boosted an early recovery of house prices in the South. However, use of the scheme has not been concentrated in London or in SR1.

There has, as yet, been no systematic analysis, of the source of recent housing demand growth at the core of SR1. There is an emerging view, not just in metropolitan London, but in other 'world cities' too, that there are increasingly globally driven demands for middle and higher value properties. These rising demands may, reflect a range of motives including rental investment demand, purchasing homes for children being educated abroad , as well as a desire for 'safe-havens' from affluent households in less stable countries. That is there are argued to be growing demands linked to global conditions rather than domestic economic circumstances and national monetary and fiscal policies.

Whatever the cause, the UK government now faces the challenge of abating house price rises in SR1 without curtailing recovery in SR2. It is increasingly recognised that a non-marginal shift in housing supply may be required but that is a longer term policy action, given the planning and other lags involved. The stance of the Bank of England and the Treasury in mid-2014 is, that in order to forestall a national rise in mortgage rates, new restrictions on loan to values and loan to incomes are to be introduced. This is the first reversal of steady deregulation in UK mortgage markets since the early 1980's. A regional dimension to this re-regulation would address some of the issues raised above but it has not been part of the policy debate. The Government seems not to have learned from past cyclical behaviours of regional housing markets and seems set to repeat the mistakes of promoting housing demand with sluggish regional supply. Single national policies are not generally effective in significantly

and permanently differentiated economic systems. New approaches to mortgage regulation, if differentially regionally applied, could align housing 'meso' regions more effectively. However, more nuanced and regionally differentiated housing supply strategy remains essential to promote growth without undue inflation in the UK.

5.6 Migration

Migration, investment and commuting to some extent explain why house prices in Super Region 2 respond with lags to economic shocks compared to the South East and Eastern regions. Giussani and Hadjimatheou (1991) state that if house prices are high in the South East relative to the North, then households might be expected to migrate to the North, leading to an equalisation in prices. Although early empirical work by Holmans (1900) and Gordon (1990) shows that regional house price differentials do not have significant effect on migration within the UK, more recent work by Murphy, Muellbauer and Cameron (2006) finds that strong housing market conditions and small stocks of dwellings deter inward migration and also increases commuting hours. Oswald and Benito (1999) find that a significant share of London's workforce live in the South East, South West, East Anglia and East Midlands. Thus a shock to the London economy, as for example a large number of redundancies, could be transmitted to the housing market of the neighbouring regions via this group without any interregional migration.

Fig 3a: House price recovery after 2007 crisis (Smoothed probability of medium growth regi...

Outer East

East Angli...

East Midland

South Wes...
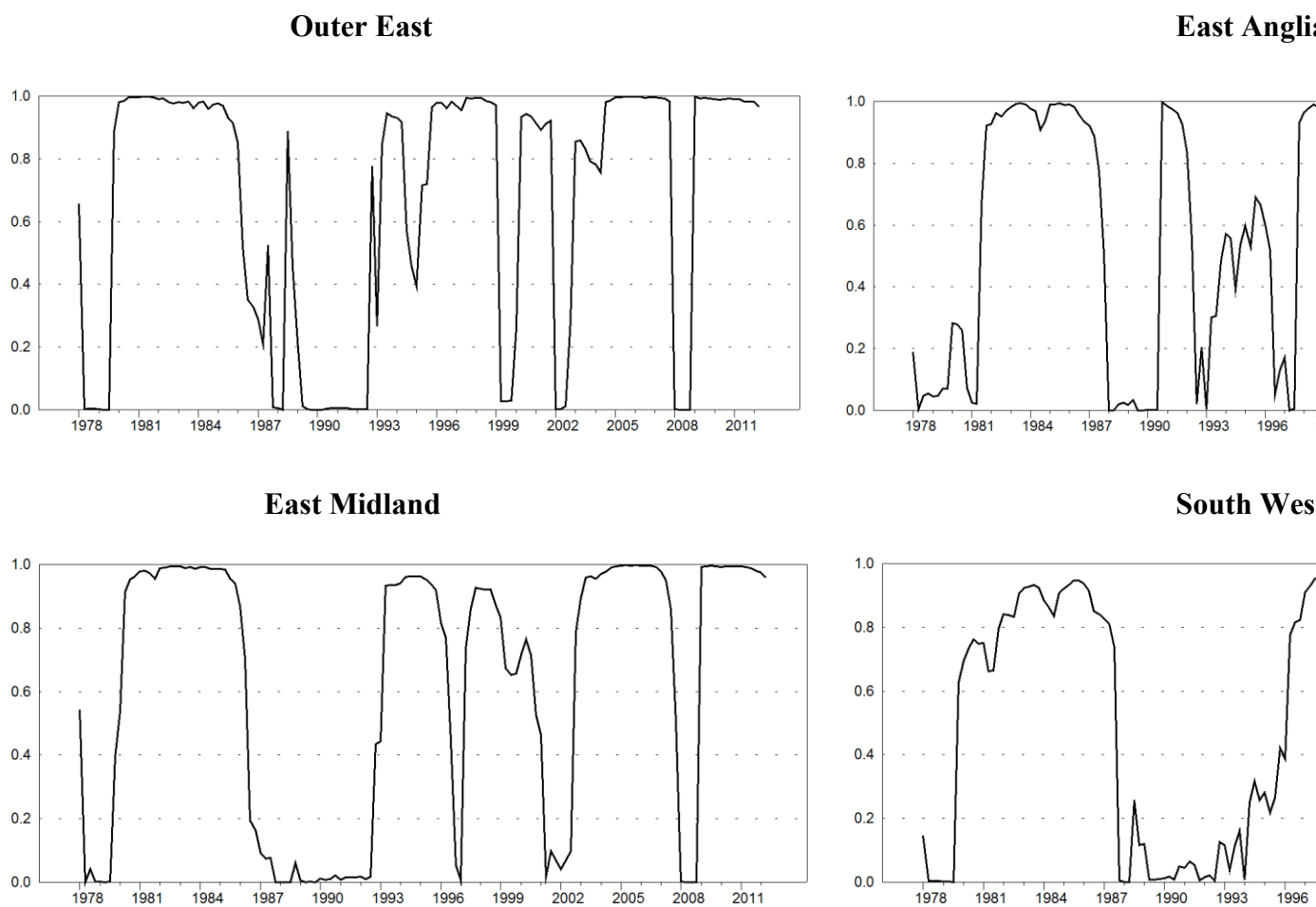
Note: Probability, *p=1* shows the regime is in medium growth rate state

Fig 3b: House price recovery after 2007 crisis (Smoothed probability of medium growth re

North

So

Wales

Yorkshire
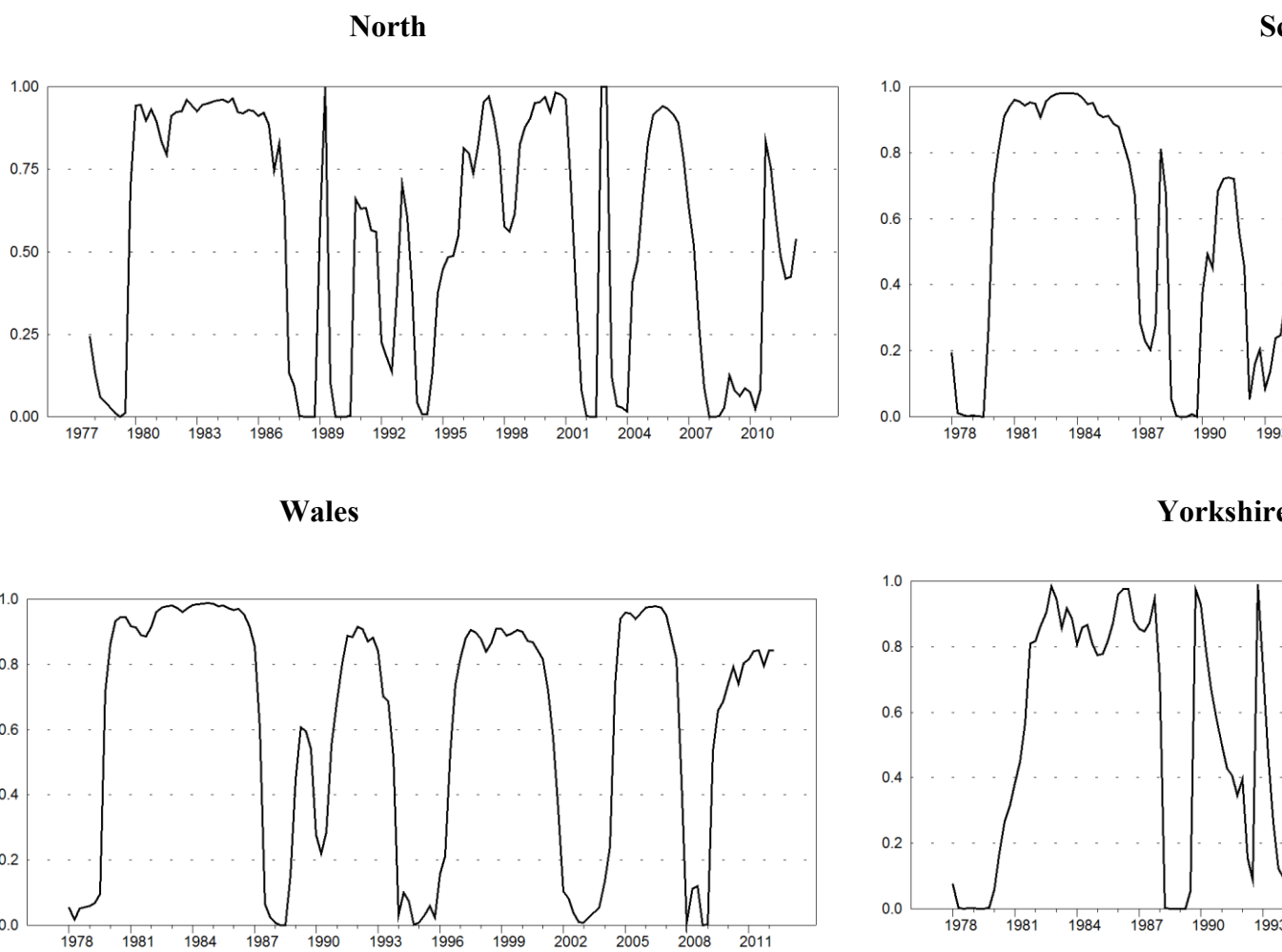
Note: Probability, *p=1* shows the regime is in medium growth rate state

6.   Conclusion

Although a significant amount of work has been done on UK's regional house price dynamics, there are few studies of regional house price cycles. In this paper we have employed MSVAR methodology to analyse regional house price cycles. Results from the study suggest that regional house prices in the UK can be described as constituting two Super Regions. Super Region One consists of regions belonging to Southern and Eastern England and the Midlands. Super Region Two consists of Wales, Scotland, North, Yorkshire and Humber and Northern Ireland.

Findings from our study also show that during economic downturns house prices in regions belonging to SR1 fall faster than for regions in SR2 and this indicates some sign of β-convergence during these periods. However, during positive growth regimes the house price growth rates in SR1 are higher than in SR2. Moreover, analysing the duration of the regimes it becomes evident that the duration of positive growth regimes are longer in SR1 than in SR2. Finally, the findings also suggest that response of house prices to growth is faster in SR1 compared to SR2.

These significant differences in both growth rates and average regime durations for the groups are attributed to the existence of regional heterogeneities in housing markets, financial sectors and labour markets. Moreover, uniform national policies exacerbate the magnitude and duration of the cycles.

These well-established patterns in house prices question the efficacy of current attempts to stimulate the UK economy through reduced credit rationing that has effects in the most pressured regions. The housing policy behaviour of the UK government confirms that Kindelberger's (1978) 'forgetting'

maxim unfortunately applies to key areas of economic policymaking and may well add to medium

term instabilities.

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Appendix

Table 1A: Factor analysis, method: Principal-component factors, rotation (unrotated)

Factors	Eigenvalues
Factor 1	7.951
Factor 2	1.4961
Factor 3	0.592
Factor 4	0.450
Factor 5	0.331
Factor 6	0.265
Factor 7	0.255
Factor 8	0.201
Factor 9	0.161
Factor 10	0.138
Factor 11	0.092
Factor 12	0.063

LR test: independent vs saturated: χ^2 (66)=2045.66,P value=0.000

Table 1B: Factor analysis/correlation, rotation (orthogonal varimax)

Factor	Variance	Difference	Proportion	Cumulative
Factor1	5.625	1.803	0.468	0.468
Factor2	3.822	.	0.318	0.787

LR test: independent vs saturated: χ^2 (66)=2045.66,P value=0.000

Table 2A: Wald test results of SR1 (P values reported)

	London	East Anglia	South West	Outer East	West Midland	East Midlands	Outer Metropolitan
Low-Medium	0.000	0.000	0.030	0.000	0.072	0.000	0.001
Medium–High	0.100	0.002	0.001	0.000	0.000	0.000	0.000
High-Low	0.000	0.000	0.001	0.000	0.000	0.000	0.000

Note: H_0: Low growth rate-Medium growth rate=0, H_1: Low growth rate-Medium growth rate $\neq 0$

H_0: Medium growth rate-High growth rate=0, H_1: Medium growth rate-High growth rate $\neq 0$

H_0: High growth rate-Medium growth rate=0, H_1: High growth rate-Medium growth rate $\neq 0$

Table 2B: Wald test results of SR2 (P values reported)

	Scotland	Wales	North	Y & H	Northern Ireland
Low-Medium	0.001	0.001	0.000	0.000	0.039
Medium-High	0.006	0.000	0.000	0.000	0.102
High-Low	0.000	0.000	0.000	0.000	0.010

Note: H_0: Low growth rate-Medium growth rate=0, H_1: Low growth rate-Medium growth rate $\neq 0$

H_0: Medium growth rate-High growth rate=0, H_1: Medium growth rate-High growth rate $\neq 0$

H_0: High growth rate-Medium growth rate=0, H_1: High growth rate-Medium growth rate $\neq 0$

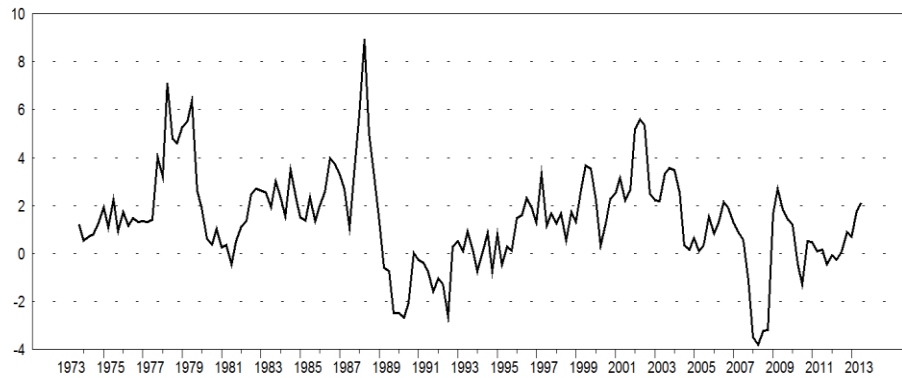### Figure A1: House price series of SR1 (HP1)
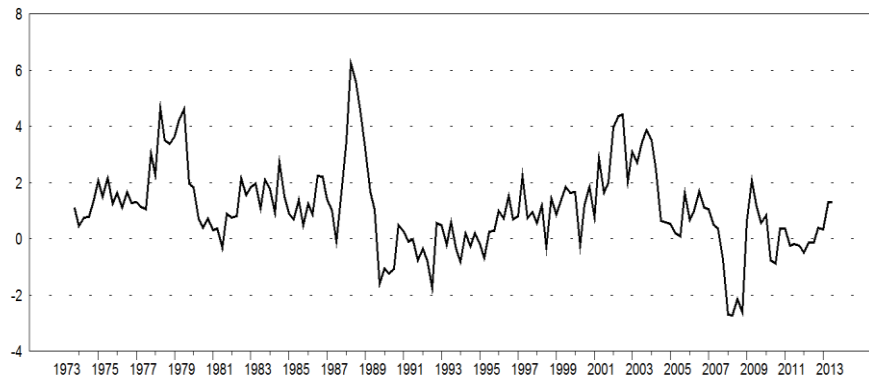
Figure A2: House price of SR2 (HP2)

Table 3A: Average growth and duration of regimes in SR1 and SR2

	SR1	SR2
Low	-1.484***	0.379
Medium	1.323***	0.626**
High	4.210***	2.785***
P(1,1)	0.700***	0.753***
P(2,2)	0.948***	0.901***
P((1,3)	0.097***	0.060
P(2,3)	0.101	0.146*
Low	3.333	4.048
Medium	19.230	10.101
High	5.050	4.854

Note: *** represent 1% level of significance, **
represent 5% level of significance and * represent