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Sensitivity of House Prices to Monetary  
Policy: Theory and Evidence

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# Financial Liberalisation and the Sensitivity of House Prices to Monetary Policy: Theory and Evidence<sup>†</sup>

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## JEL summary

We analyse the impact of financial liberalisation on the link between monetary policy and house prices. We present a simple model of a small open economy subject to credit constraints. The model shows that the higher the degree of financial liberalisation, the stronger is the impact of interest rate shocks on house prices. We then use vector autoregressions to study the role of monetary policy shocks in house price fluctuations in Finland, Sweden and UK, characterised by financial liberalisation episodes over the last twenty years. We find that the response of house prices to interest rate surprises is bigger and more persistent in periods characterised by more liberalised financial markets.

**Keywords:** House prices, monetary policy, financial liberalisation.

**JEL Classification Numbers:** E52, E32, C32, R21.

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# **Financial Liberalisation and the Sensitivity of House Prices to Monetary Policy: Theory and Evidence**

## **Abstract**

This paper analyses the impact that a process of financial liberalisation can have on the link between monetary policy and house prices. In the first part of the paper we present a simple theoretical model of a small open economy subject to credit constraints. The model shows that the higher is the degree of financial liberalisation of the economy, the stronger is the impact of monetary policy shocks on house prices. In the second part of the paper we use a VAR approach to study the role of monetary policy in house price fluctuations in three European countries (Finland, Sweden and UK) characterised by major episodes of financial liberalisation over the last twenty years. Our findings are in general consistent with the idea that the response of house prices to monetary shocks is bigger and more persistent in periods characterised by more liberalised financial markets.

**Keywords:** House prices, monetary policy, financial liberalisation.

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# 1. Introduction

In the last three decades or so, many industrialised countries have experienced wide changes in house prices. It is generally felt that monetary policy conditions have been an important factor behind house price inflation and deflation. It is also agreed that the process of financial liberalisation can have played a direct role in these fluctuations (IMF, 2000) but little is known, instead, on the possible indirect role that financial liberalisation could have had modifying the sensitivity of house prices to monetary policy actions. This paper takes a preliminary step in investigating this issue. In the first part of the paper we present a simple theoretical model of a small open economy subject to credit constraints. With the help of numerical calibrations of the model, we analyse the impact of interest rate shocks on house prices in regimes characterised by different levels of financial liberalisation. The results show that the higher is the degree of financial liberalisation of the economy, the higher is the impact of monetary policy shocks on house prices.

In the second part of the paper we analyse by means of vector autoregressions (VAR) how house prices respond to monetary policy shocks in three European economies (Finland, Sweden and UK). We test whether in these economies the sensitivity of house prices to monetary policy has increased over time as a result of the process of financial deregulation. The results of this empirical section reveal that the magnitude of the response of house prices to monetary shocks is higher and the persistence longer in periods characterised by more liberalised financial markets.

The paper is organised as follows: section 2 presents the model and the numerical simulations. Section 3 describes the econometric methodology, the data and the econometric results. Section 4 concludes.

## 2. A simple theoretical model

### 2.1. Framework

The (oversimplified) framework is the standard representative agent model. The economy is small and open to the rest of the world, facing the risk of exogenous shocks to the (stochastic) real world interest rate. The representative agent in this economy enjoys utility from consumption of two different goods, a consumption non-durable good, whose price is the numeraire, and a durable good, house henceforth, whose characteristic is to yield utility services forever. Only the non-durable good is internationally tradable.

As a non-standard feature of the model, we introduce a credit constraint on the total amount of borrowing from abroad: the outstanding foreign debt of the representative agent in the domestic economy must not exceed a fraction  $\varphi$  of the total value of the housing stock. The parameter  $\varphi$  will be shown to be a key element of the model, in that it can easily be thought as a proxy for the degree of financial liberalisation of the economy.

We will first start from analysing the behaviour of the constrained economy. Then we introduce standard assumptions that enable us to construct a rational expectations steady state equilibrium in which the economy is in a credit-constrained regime. We then compare the effects of monetary policy shocks for different degrees of financial liberalisation, i.e. for different values of the parameter  $\varphi$ . It turns out that interest rate shocks have more powerful effects on real house prices the higher the value of  $\varphi$ . This complements the result that others (Miles, 1992) have shown in a different framework, according to which financial liberalisation can *directly* lead to fluctuations in house prices.

## 2.2. The representative agent problem: the general case

The representative agent maximises his expected utility defined over random sequences of consumption ( $C_t$ ) and houses ( $H_t$ ):

$$U = E_0 \left( \sum_{t=0}^{\infty} \beta^t \{u(C_t, H_t)\} \right)$$

$E_0$  denotes the expectation based on the information set available at time 0;  $\beta$  is the discount rate.

The economy is subject to the following constraints:

$$B_t = R_t B_{t-1} + AF(K_{t-1}) - C_t - P_t(H_t - H_{t-1}) - (K_t - (1 - \delta)K_{t-1}) \quad (1)$$

$$H = \text{given}, H_t = H_{t-1} \quad (2)$$

$$\frac{\varphi_t E_t(P_{t+1})H_t}{R_{t+1}} + B_t \geq 0 \quad (3)$$

where, with standard notation, the first constraint (1) describes the evolution of the level of net foreign bonds  $B$ ,  $R$  is the gross international real rate of return,  $AF(K)$  describes the domestic production technology as a function of the capital stock  $K$ ,  $P$  is the relative price of housing  $H$ , and the last term in brackets is the accumulation equation for the capital stock  $K$ . The second constraint (2) assumes that the stock of houses is fixed and does not depreciate over time. This assumption, while useful to simplify the analysis, bears no implications for the main target of the paper, namely to analyse the relative sensitivity of house prices to interest rate changes in a financially liberalised economy versus a less liberalised one. In fact a non-vertical short run housing supply curve would complicate the analysis by adding another state variable to the

model, and the main difference would be that both house prices and the housing stock would be more sensitive in a liberalised setting.<sup>1</sup>

Finally, the third constraint (3) states that the level of foreign debt must not exceed a fraction  $\varphi$  of the present discounted value of the housing stock. Throughout the analysis, we assume that  $\beta R \leq 1$ . The strict inequality case ensures a steady state in which the credit constraint is strictly binding for the domestic economy.

The first order conditions for this problem are given (respectively for  $B$ ,  $H$  and  $K$ ) by:

$$U_{c,t} - \lambda_t = \beta U_{c,t+1} R_{t+1} \quad (4)$$

$$U_{c,t} P_t - U_{h,t} - \lambda_t \varphi_t P_{t+1} - \beta U_{c,t+1} P_{t+1} = 0 \quad (5)$$

$$U_{c,t} - \beta U_{c,t+1} [AF_K(K_t) + 1 - \delta] = 0 \quad (6)$$

where  $\lambda$  denotes the shadow price of the borrowing constraint.

In addition, we have the following equilibrium conditions in the goods and in the capital markets:

$$B_t = R_t B_{t-1} + A_t F(K_{t-1}) - C_t - P_t (H_t - H_{t-1}) - (K_t - (1 - \delta) K_{t-1}) \quad (1)$$

$$H_t = H_{t-1} = H \quad (2)$$

$$\lambda_t (\varphi_t P_{t+1} H_t / R_{t+1} + B_t) = 0 \quad (3')$$

The equations (1), (2), (3'), (4), (5) and (6) constitute a dynamic system of 6 equations in the 6 unknowns:  $C$ ,  $H$ ,  $K$ ,  $B$ ,  $\lambda$ ,  $P$ .

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<sup>1</sup> Hence the simulations in the paper will probably end up overestimating the response of house prices to interest rate changes. However the paper's main aim is not to quantify house price responses, rather to assess the link between interest rate sensitivity of house prices and degree of liberalisation.

### 2.3. A simple functional specification and the steady state equilibrium

We assume that the momentary utility function has a simple log form  $u = \log C + \gamma \log H$  and that the production function is a Cobb-Douglas:  $Y = AK_{-1}^{\alpha}$ . In this case, the first order conditions (4) to (6) become:

$$1/C_t - \lambda_t = \beta R_{t+1} / C_{t+1}$$

$$P_t / C_t - \gamma / H_t - \lambda_t \varphi_t P_{t+1} - \beta P_{t+1} / C_{t+1} = 0$$

$$1/C_t - (\beta / C_{t+1}) \cdot (\alpha A Y_t / K_{t+1} - \delta) = 0$$

In addition we can describe the deterministic steady state values of the endogenous variables of the model as given by, assuming  $H=1$ :

$$K = \left( \frac{\alpha}{1/\beta - 1 + \delta} \right) Y = \left( \frac{\alpha}{1/\beta - 1 + \delta} \right)^{\frac{1}{1-\alpha}}$$

$$Y = K^{\alpha}$$

$$C = \frac{1 - \frac{\alpha\delta}{1/\beta - 1 + \delta}}{1 + \frac{\gamma\varphi(1 - 1/R)}{1 - \beta - \varphi(1/R - \beta)}} Y$$

$$P = \frac{\gamma}{1 - \beta - \varphi(1/R - \beta)} C$$

$$B = -\varphi P / R$$

$$\lambda = (1 - \beta R) / C$$

The first two equations define steady state values for capital and output. The third and fourth define respectively equilibrium consumption and house price in the economy. The fifth equation gives the steady state level of net foreign assets. Finally, the last equation shows that, so long as the time preference rate is less than the gross world interest rate, the borrowing constraint will

strictly bind in steady state. In addition one can combine the equations above to obtain an expression for the steady state value of net foreign bonds (over capital stock):

$$\frac{B}{K} = \frac{\gamma\varphi(\beta^{-1} - 1 + \delta(1 - \alpha))}{(1 - \beta - \varphi(1 - \beta R - \gamma(R - 1)))\alpha} \frac{1}{R} \quad (7)$$

Simple algebra shows that this ratio is increasing in  $\varphi$  and decreasing in  $\gamma$ , the weight on housing in the utility function. We will exploit this expression below.

Since the multiplier on the borrowing constraint  $\lambda$  is positive, we can replace (3') with:

$$\varphi_t P_{t+1} H_t / R_{t+1} + B_t = 0 \quad (3'')$$

## 2.4. The effects of an interest rate shock

### A. A preliminary qualitative assessment

We turn now to a numerical analysis of the model. The methods are familiar. We log-linearise around the steady state described by the above equilibrium conditions (1) to (6), replacing (3) with (3''), and find the linear decision rules using the method of the undetermined coefficients.

Here we provide some qualitative insights on the effects of an interest rate change. To keep algebra simple (and without loss of generality), we assume that  $\beta R = 1$  and consider the situation in which the credit constraint is on the brink between binding and non-binding, i.e. both terms of the product in (3') ( $\lambda$  and  $B + \varphi PH / R$ ) are equal to zero. Denote with a hat percentage deviations of a variable from the steady state, that is  $\hat{x}_t = (x_t - x) / x$ , where  $x$  is the steady state value of  $x_t$  (for  $\lambda$  we refer to absolute deviations, since we log-linearise now around a zero value).

Iterating forward the equation (5) for the house price dynamics gives:

$$\hat{P}_t = \hat{C}_t + \varphi C \sum_{t=0}^{\infty} \beta^i \hat{\lambda}_{t+1}.$$

Doing the same for the consumption Euler equation (4) yields:

$$\hat{C}_t = -C\hat{\lambda}_t - C\hat{\lambda}_{t+1} + \hat{C}_{t+2} + \hat{R}_{t+2} + \hat{R}_{t+1} = -C \sum_{i=0}^{\infty} \hat{\lambda}_{t+i} - \sum_{i=0}^{\infty} \hat{R}_{t+i} \quad (8),$$

and therefore, combining the last two equations<sup>2</sup>:

$$\hat{P}_t = \hat{C}_t + \varphi C \sum_{i=0}^{\infty} \beta^i \hat{\lambda}_{t+i} \cong - \sum_{i=0}^{\infty} \hat{R}_{t+i} - C \left[ \sum_{i=0}^{\infty} \hat{\lambda}_{t+i} (1 - \varphi \beta^i) \right] \quad (9).$$

Looking at equations above we can easily get the following qualitative insights:

1) A constrained and an unconstrained economy respond differently to an interest rate the shock. This difference stems from the fact that the credit capacity of a constrained economy, which affects consumption and housing demand, depends on the value of its collateral (housing stock) and hence on house prices (a similar link between credit capacity and land prices is developed in Kiyotaki and Moore, 1997). More interestingly for our purposes, looking at the equations (8) and (9), it emerges that, to the extent that  $\varphi$  differs from zero, house prices will respond differently from the consumption of the non-durable good when the economy enters the constrained regime (this case happens following interest rate decreases, which implies that  $\lambda > 0$  temporarily). Conversely, changes in the interest rate that lead the economy out of the

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<sup>2</sup> In the general case in which  $\beta R < 1$ , the analogue of expression (9) above reads as:

$$\hat{P}_t = \hat{C}_t + \beta (\hat{P}_{t+1} - \hat{C}_{t+1}) + \varphi (1 - \beta R) (\hat{\lambda}_t + \hat{P}_{t+1} - \hat{R}_{t+1}) / R$$

Despite being similar to equation (9) in the main text, this formula lends itself less to a qualitative analysis, although it will be used in the numerical simulations.

constrained region (increases) always lead house prices and consumption to react in the same way, since in that case the multiplier  $\lambda$  always equals zero.

2) For a given initial steady state, different values of  $\varphi$  imply different responses of house prices to changes in the interest rate. This can be inferred from the fact that in (9)  $\varphi$  appears to affect explicitly the dynamics of house prices. Yet a clear interpretation can be given only using numerical simulations since the multiplier  $\lambda$  is endogenous too.

3) Since different levels of  $\varphi$  imply different initial steady states and different levels of the steady state ratios  $B/K$  and  $C/K$  (as can be seen from equation (7)), the degree of financial liberalisation will affect the dynamic response of house prices also through this channel. This can be observed from equation (9), where the steady state consumption level  $C$  affects the response of house prices.

Overall, the incidence of financial liberalisation on the link between house prices and interest rates depends on two main factors:

- a) A *wealth* factor. The reduction in the interest rate reduces the interest burden on debt, determining an increase in housing demand and consumption demand. This effect is bigger, the bigger the outstanding debt/asset ratio ( $B/K$ ) of the economy. Since financially liberalised economies are able to sustain a higher level of debt in the steady state equilibrium, they benefit more from a reduction in the interest burden. This wealth effect depends on the initial steady state of the economy.
- b) A *distortion* factor. This second effect derives from the different degrees of distortion that different degrees of financial liberalisation have on the intratemporal choice between houses and consumption goods. In a rationed economy, when  $\varphi$  is high, houses have a stronger role as collateral. Consider for instance a reduction in the interest rate, and

following it, an increase in house prices. If this shock increases the shadow price of the credit constraint (as it will be shown to happen in the numerical simulations), the importance of houses as collateral, and hence housing demand, will increase pushing house prices higher even more. In the numerical simulations we will show that, at least over short horizons, this distortion factor works generally in the same direction of the wealth factor.

## **B. Model simulations**

We parameterise the model choosing fairly standard values for the taste and technology parameters. We set the quarterly world interest rate at 1%, and fix the discount factor at 0.985. The elasticity of output to capital is set equal to 0.4. We experience below with different values of  $\gamma$  and  $\varphi$ , the two remaining parameters of the model. However, the results were robust to a wide range of parameterisations.

Figures 1 to 3 show graphically the impulse responses following an interest rate shock for three economies characterised by different degrees of financial liberalisation.

A reduction in the interest rate determines an increase in the relative price of houses that is higher in economies with a higher degree of financial liberalisation (figure 1 versus figure 2). As already stressed, this behaviour is the result both of a wealth and of a distortion effect. It is worth disentangling their relative importance in the link between financial liberalisation and the sensitivity of house prices to monetary shocks. Figures 2 and 3 compare two economies for which we net out the wealth effect. The device we use is to assume different initial values of the parameter  $\gamma$ , the relative weight given to housing in the utility function.  $\gamma$  does not affect the dynamics of the system but only the initial steady state. Therefore, in order to start from the same

steady state ratios  $B/K$  and  $C/K$ , we let different values of  $\gamma$  correspond to different values of  $\varphi$  according to equation (7). After neutralising the wealth effect, the reaction of house prices to a decrease in the interest rate appears stronger (even though less persistent) the higher is the degree of financial liberalisation of the economy. Therefore, the distortion factor appears to work in the same direction of the wealth factor (at least over short horizons).

We have therefore shown that the traditional price channel of monetary policy is generally stronger in more liberalised economies<sup>3</sup>. Despite its simple structure, the model captures some of the main features of countries affected by recent house price inflation. The Nordic countries for instance (Sweden, Finland and Norway) are all small open economies that experienced financial liberalisation during the Eighties, when they deregulated the internal financial market (“internal financial liberalisation”) and opened to foreign capital inflows (“external financial liberalisation”).

The analysis has a number of shortcomings, first of all the fact that we identify financial liberalisation only with lower down-payment restrictions. As to the actual lack of money in the framework (actually we identify monetary shocks with interest rate shocks) this is probably less troubling, since in many countries the conduct of monetary policy uses interest rates as instruments.

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<sup>3</sup> In addition, the model implies that the effects of an interest rate shock will be partially asymmetric: however, we will not test this prediction.

## **3. Empirical analysis**

### **3.1. Financial liberalisation in European housing markets**

Starting from the second half of the Eighties, a number of European countries underwent a massive process of deregulation of the financial markets, including the housing finance markets<sup>4</sup>. The main steps of this process consisted of the abolition of ceilings on deposits and lending interest rates, relaxation of portfolio restrictions for financial institutions (both on the liability and on the asset side), withdrawal of entry restrictions (also on foreign institutions) and relaxation of quantity restrictions on borrowers (like down-payment requirements). The extent and the pattern of this process differed widely across countries: the Nordic countries and the UK experienced a major structural break in their financial markets. In Sweden ceilings on lending rates and quantitative controls on bank loans were abolished in 1985. In this liberalised and competitive environment banks increased their exposure to the real estate sector both directly and indirectly, through their important share of control in the finance companies active in the housing market. In Finland lending rates were liberalised in 1986, with floating rates allowed on all loans in 1988. In UK the process of liberalisation took place in different steps from 1980 to 1986 culminating in the Building Societies Act in 1986.

We test our hypothesis on the impact of financial liberalisation on the link between monetary policy and house prices. We apply a VAR methodology to three European economies deeply affected by financial deregulation during the Eighties, namely UK, Sweden and Finland. Our claim is that in these countries financial liberalisation would have determined a regime shift

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<sup>4</sup> It would be unwise to fully review the literature on this issue here. See IMF (2000) for an overview and references therein.

increasing the effectiveness of monetary policy in the housing market<sup>5</sup>, in line with the theoretical model presented in section 2.

A first way of analysing the impact of deregulation on the effectiveness of monetary policy in the housing market is contrasting the impulse responses of real house prices to monetary policy innovations across sub-periods characterised by different degrees of financial liberalisation<sup>6</sup>. The main problem associated with this strategy is that a direct comparison of the stance of monetary policy is made hard by the fact that the shock varies in size, shape and duration across sub-samples. However, we normalise the shocks across countries and subperiods to be equal to one standard deviation in size in each of the subsamples: this procedure has the virtue of neutralising differential effects of monetary policy due to less or more erratic monetary policies across subsamples.

The second strategy we will use is to detect the fraction of the house price variability that can be accounted for by the variability in monetary policy instruments (variance decomposition) in sub-samples characterised by different degrees of regulation.

### **3.2. Empirical methodology**

To gauge whether monetary policy mattered differently for movements in house prices in the two sub-samples, we estimate for each country two four-variable autoregressions (VAR), one

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<sup>5</sup> A different but related issue is whether financial liberalisation modified the transmission mechanism of monetary policy, for instance affecting the relative importance of the interest rate channel versus the credit channel. The prevailing view is that the relaxation of financial constraints could have progressively shifted the transmission mechanism from the interest rate channel to the credit channel.

<sup>6</sup> An analogous exercise on the differential impact of monetary policy on land prices in Japan (before and after financial liberalisation) is performed by Hoffmaister and Schinasi (1994).

before the financial liberalisation episode, the other after, using quarterly data on GDP, consumer price inflation, short-term interest rates and real house prices.

Although it is not possible to determine with precision when the three economies entered the liberalised regime, for all the three countries the shift from a regulated to a liberalised environment is treated as having occurred in the second half of the eighties. We split the whole sample approximately around that period, allowing for Finland and Sweden some overlapping between the two subperiods in order to preserve degrees of freedom. To check the robustness of our findings, we also tried various slightly different subsamples with no significant changes in the results.

Following Bernanke and Blinder (1992), and most of the subsequent literature on the monetary policy transmission mechanism, we include a three month domestic rate as our monetary policy variable. This variable can easily be considered as the Central Bank's main short run target. Of course, in small economies like Sweden and Finland, this variable is likely to be determined not only by the domestic Central Bank, but also indirectly by the policy of another Central Bank, such as the Bundesbank. This is consistent with our theoretical analysis, that implicitly assumes that the domestic interest rate is tied to a (unspecified) world interest rate. For each country we choose two or three lags - depending on how many were sufficient to induce noiselike residuals according to the Akaike criterion - and include the following variables, observed with quarterly frequency: the log of real GDP, annualised consumer price inflation, a short term interest rate and a real house price index (in log) in that order.<sup>7</sup> The ordering reflects

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<sup>7</sup> Data sources and subsamples are as follows:

Country	Subsamples	Variables (GDP Y, and inflation DP were taken from the IMF International Financial Statistics)

the possibility that innovations in the interest rate can affect output and consumer price inflation only with one lag, whereas they can immediately affect house (asset) prices. It is also consistent with our theoretical model, in which output takes one period to be produced – thus reacting with one period lag to an interest rate shock - whereas real house prices immediately respond to variations in the real interest rate. The results were however robust to alternative orderings of the variables in the Choleski decomposition of the variance-covariance matrix of the residuals.

The results of the unit root analysis show that all the variables are I(1) at the 95% confidence level, with the exception of CPI inflation in Sweden, which appears stationary.<sup>8</sup> Since it is possible to find evidence of cointegration in some of the samples, we do not difference the variables and estimate in each case an unrestricted VAR in levels. The results are shown on figure 4, alongside with 90% bootstrapped confidence bands (obtained with 500 replications).

### 3.3. Empirical findings

Figure 4 displays the estimated impulse responses for a contractionary monetary shock. In general, the main findings can be summarised as follows. First, in all countries and time subperiods there is a persistent rise in the short-term interest rate, that lasts on average between

Finland	78Q4 - 89Q2	HP: Residential Property Prices (source: BIS)
	87Q2 - 99Q3	R: Money Market Rate (Primark Datastream)
Sweden	72Q1 - 86Q4	HP: House Price Index, average of Primary and Leisure Homes (Statistics Sweden)
	87Q1 - 99Q3	R: 3 months Money Market Rate (Datastream)
UK	74Q1 - 86Q2	HP: Nationwide East Anglia House Price Index (Datastream)
	86Q3 - 99Q4	R: Treasury Bill Rate (Datastream)

<sup>8</sup> The corresponding Dickey-Fuller test statistic is  $-5.09$ . To save space, the results of the unit-root and cointegration tests are not reported; however, they are available from the authors upon request.

one and two years. Second, there is a temporary decline in GDP. Third, after an initial delay, consumer prices inflation falls.

Turning to *real* house prices, they significantly decrease in virtually all the three countries following a monetary contraction. A rapid look at Figure 4 shows that, altogether, not only after the half of the Eighties the response of house prices was much more pronounced for a given innovation in the interest rate but also that the dynamics in house prices exhibited more persistence.

In Sweden, the impact of a monetary policy shock on house prices is weak in the first sub-sample while a smaller - measured in terms of an increase in the interest rate - negative shock in the second sub-sample leads to a slightly stronger (0.75% versus 0.6% at the trough) decrease in real house prices.

More robust results apply for the UK: here an interest rate rise clearly appears to affect house prices more in the second subsample. In particular a smaller - about half as big - and less persistent shock leads to a fall in real house prices twice as big as in the first subsample.

The results for Finland look instead less consistent with our thesis. While over the short run it appears that house prices react to monetary shocks more in the second subperiod, the situation appears reversed after about two years. Here, interest rate increases seem to have shifted the timing of the response, but not its size.

A related but different question is: in which proportion do interest rate shocks contribute to the volatility of house prices in the two sub-periods? To answer this question, we resort to variance decompositions. The results are shown in Figure 5, which for each quarter plots the fraction of the  $k$ -step ahead forecast error variance of real house prices explained by the monetary shocks, again comparing the before and after financial liberalisation periods. Even here, the results are broadly in line with those from the impulse response analysis. The share of the

variation in real house prices accounted for by the monetary policy shock measure is larger at all horizons in the second period both in Sweden and in UK. The results are instead inconclusive as far as Finland is concerned, thus echoing those from the impulse response analysis, with monetary policy mattering more at short horizons (less than two years) in the second period, and less at longer horizons.<sup>9</sup>

Altogether, the results broadly support the thesis that during the period of financial liberalisation interest rate shocks had more powerful effects on the relative price of houses, with the UK and, to a less extent, Sweden featuring the clearest and most supportive results.

## 4. Conclusions

In this paper we have analysed and tested the impact of financial liberalisation on the link between monetary policy and house prices. The results suggest that financial liberalisation could have had a major role not only *directly* spurring house prices but also *indirectly* increasing the policy sensitivity of the housing market. The normative implications of the analysis are relevant. Just to mention one, the intensity of the process of financial liberalisation has been strongly asymmetric across European countries. Most of these countries (including Finland and in perspective also Sweden and UK) are now characterised by a centralised conduct of monetary policy. At the same time, given the importance of housing wealth in households and businesses

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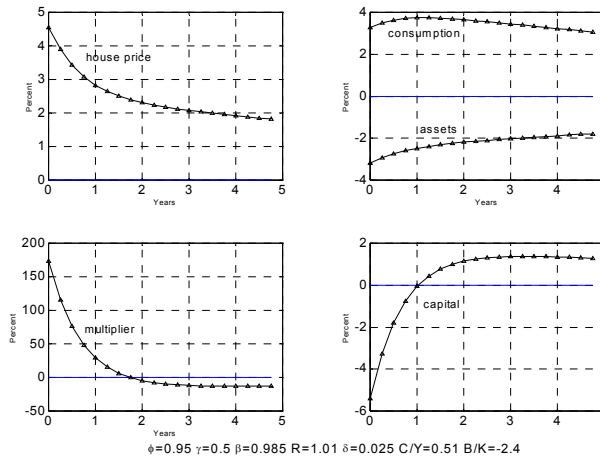
<sup>9</sup> Even though the analysis has been conducted entirely at a within country level it is also interesting to note however that, for substantially comparable monetary shocks, the United Kingdom, i.e. the country with the highest loan-to-value ratios, experiences the biggest house price response to (normalised by the same increase in the interest rate) monetary shocks. However, this cross-country comparison cannot be stretched too far because many other features could explain this higher sensitivity (lower transaction costs, a larger owner-occupied sector, a large proportion of variable-interest mortgage loans).

portfolios, housing markets play a key role in the transmission of monetary policy. In the presence of significant differences in the degree of regulation of the housing finance markets, therefore, the effects of monetary policy shocks could differ widely across countries, even abstracting from further considerations like different housing tenure patterns or transaction costs. As an obvious corollary, a further convergence of the regulatory framework could clearly make the conduct of monetary policy easier and more effective in the Euro area.

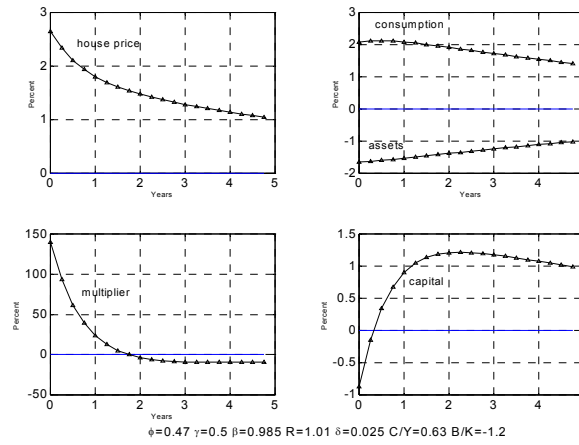
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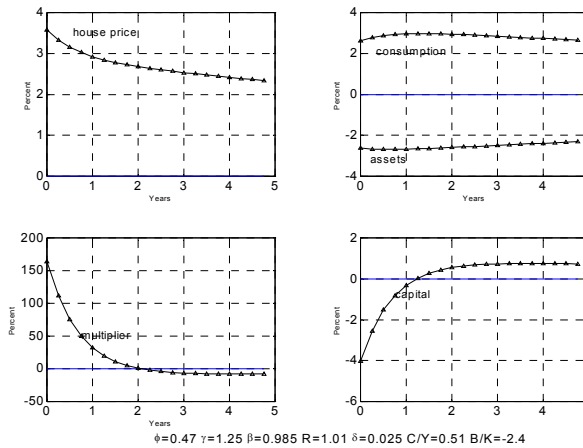
**Figure 1:** Theoretical responses to 1% fall in R (shock autocorrelation=.7), low degree of financial liberalisation



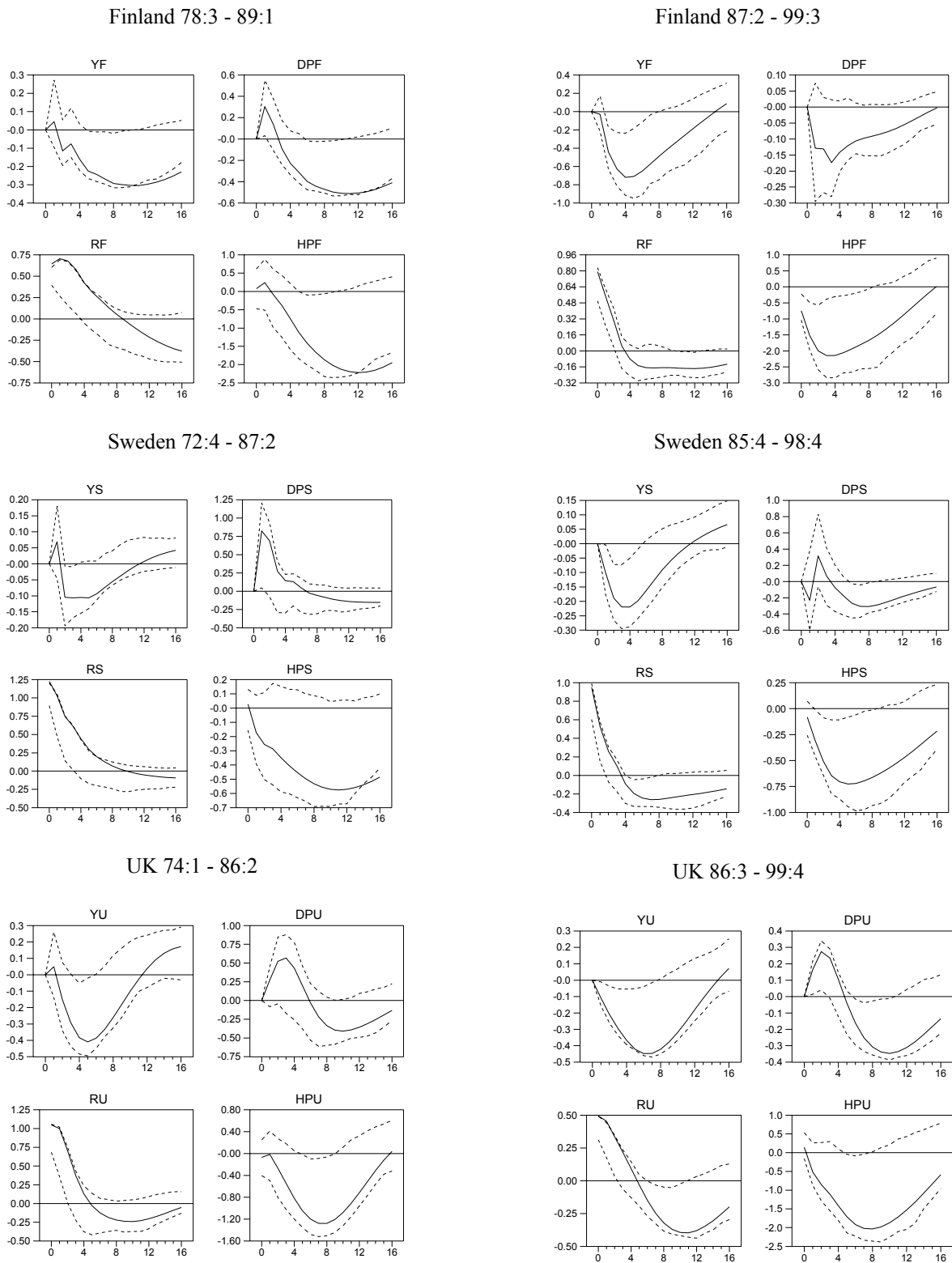
**Figure 2:** Theoretical responses to 1% fall in R (shock autocorrelation=.7), high degree of financial liberalisation.



**Figure 3:** Theoretical responses to 1% fall in the R, (shock autocorrelation=.7), same wealth effect as in Figure 2, but lower  $\phi$ .



**Figure 4:** Impulse responses from VAR to a negative monetary shock (90% dashed confidence bands) in the periods shown. Y refers to GDP, DP to annualised inflation, R to short-term interest rate and HP to real house prices. Horizontal axes measure quarters. Vertical axes measure percentage deviations from baseline.



**Figure 5:** Percent of the  $k$  ahead error forecast error variance of real house prices due to monetary shocks before (B) and after (A) financial liberalisation respectively in Finland (F), Sweden (S) and UK (U).

