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**Tax Incentives and House  
Price Volatility in the Euro  
Area: Theory and Evidence**

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**TAX INCENTIVES AND HOUSE PRICE VOLATILITY IN THE EURO AREA: THEORY AND EVIDENCE**

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by  
**Paul van den Noord**

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## ABSTRACT/RÉSUMÉ

### **Tax Incentives and House Price Volatility in the Euro Area: Theory and Evidence**

A problem associated with inflation differentials in monetary unions is that the “crowding-in” effect of lower real interest rates associated with high inflation will initially outweigh the loss of competitiveness (crowding out). The crowding-in effect may produce volatility in house prices, especially if tax regimes favour the occurrence of bubbles. This paper shows that this is the case notably in the smaller countries of the euro area, and this could explain the persistence of inflation differentials in the area to some extent.

*JEL codes:* H2, E52, E61, F42.

*Keywords:* Taxation, economic and monetary union.

\* \* \* \* \*

### **Incitations fiscales et volatilité des prix d’immobilier dans la zone euro: théorie et évidence**

Un problème dû aux différences d'inflation en union monétaire est que, initialement, l'effet stimulant de taux d'intérêt bas venant des taux d'inflation élevés l'emporte sur l'effet perte de compétitivité. L'effet stimulant peut produire une volatilité accrue des prix d'immobilier, surtout lorsque le régime fiscal tend à favoriser l'émergence de bulles. Ce papier démontre que c'est en effet le cas, notamment dans les plus petits pays de la zone euro, ce qui peut expliquer en partie la persistance des différentiels d'inflation dans la zone euro.

*Classification JEL:* H2, E52, E61, F42.

*Mots-clés:* Fiscalité, union économique et monétaire.

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## **TAX INCENTIVES AND HOUSE PRICE VOLATILITY IN THE EURO AREA: THEORY AND EVIDENCE**

Paul van den Noord<sup>1</sup>

### **Introduction**

1. The Maastricht Treaty stipulates that countries' inflation rates should converge towards (and not exceed by more than 1½ percentage point) the average of the three lowest-inflation member countries to qualify for entry into the euro area. Inflation dispersion indeed diminished considerably in the run-up to EMU in 1999. Inflation dispersion in the area has picked up somewhat since, but it has not been large by historical standards and is also not out of line with inflation differentials observed among regions in the United States (OECD, 2003).

2. Nevertheless, monetary policy will always have to focus on the area as a whole, and seldom fit the requirements of any individual country. Therefore, inflation differentials may persist (Hoeller *et al.*, 2002). A problem associated with inflation differentials in monetary unions is that the "crowding-in" effect of lower real interest rates associated with high inflation will initially outweigh the loss of competitiveness (crowding out). The crowding-in effect may produce asset (housing price) bubbles, especially if tax regimes favour the occurrence of such bubbles. This paper shows that this is the case notably in the smaller countries of the area, and this could explain the persistence of inflation differentials in the area to some extent.

3. The paper starts with a discussion of a simple theoretical model of the housing market. This is followed by an empirical investigation of the *ex ante* impact of income taxation on the real financing cost of owner-occupied housing in euro area countries. The paper ends with some concluding remarks.

### **A simple model of owner-occupied housing**

4. Cycles in owner-occupied housing markets produce swings in household wealth that in turn exacerbate the overall cyclical variation in economic activity (Boone and Girouard, 2002). The housing cycle stems from the relatively inelastic supply of housing which, to the extent housing demand varies over time due to changes in economic (income expectations, real interest rates) or other (demographic, preferences) conditions, may result in strong movements in prices.

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1. The author is senior economist in the Economics Department. He is indebted to Laurence Boone and Peter Hoeller for their comments on an earlier draft. Any opinions expressed in this paper are the author's and should not be attributed to the Organisation or its Member Countries.

5. However, one additional factor that can exacerbate volatility in house prices is the myriad tax incentives governments provide to stimulate house ownership. A tax system that contains generous incentives for house ownership not only results in a higher steady-state level of house prices (and an associated misallocation of resources), but may result also in greater volatility of house prices. Specifically, it means that the tax breaks for owner-occupied housing would act as a destabilising force, to some extent offsetting the automatic stabilising properties that are normally attributed to income taxation (Van den Noord, 2000). In a monetary union with widely different tax systems this may be one factor behind inflation divergence.

6. The volatility of house prices results from a combination of price-inelastic supply of newly built dwellings and preferential tax treatment of owner-occupied housing. This can be demonstrated with a relatively simple model developed by Poterba (1984, 1991).<sup>2</sup>

7. According to this model the demand for owner-occupied housing declines with the purchase price of housing. However, the price sensitivity of demand tends to fall (*i.e.* the slope of the demand curve to increase) with the degree of preferential tax treatment and the expected house price inflation (or capital gain). A fall in the interest rate also produces a reduction in the price sensitivity of demand. This can be shown as follows. The starting point is the assumption that equilibrium in the market for existing owner-occupied houses requires that homeowners, in their role as investors, earn the same return on housing investment as on other assets. This requires that they equate the marginal value of rental services from owner-occupied housing with the user cost of capital attached to a marginal unit of housing:

$$(1) \quad R(H) = [r(1 - \tau) + \delta - \pi]P_H$$

where  $R$  is the marginal value of the rental services per period on owner-occupied homes,  $r$  is the nominal interest rate,  $\tau$  is the marginal effective tax rate on interest income (which in a tax system that taxes net interest income in the same way as other earnings is equal to the marginal income tax rate),  $\delta$  is the rate of depreciation,  $P_H$  is the price of owner-occupied housing and  $\pi$  is the expected rate of house price inflation. The marginal value of the rental services is a negative function of the total housing stock  $H$ , hence  $dR/dH < 0$ . Therefore equation (1) can be interpreted as the (downward-sloping) demand function for housing.

8. The supply function relates the total stock of housing to the flow of net construction, which is a function of the ratio of house prices to construction cost ( $C$ ):

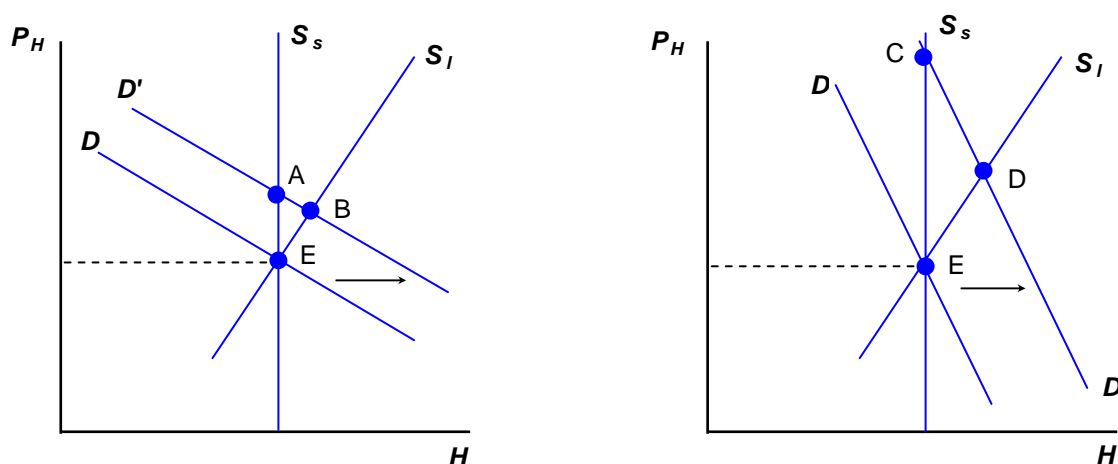
$$(2) \quad H_t = (1 - \delta)H_{t-1} + \varphi(P_H / C)_t$$

$\varphi$  is the positive short-run price sensitivity of supply. This sensitivity is typically very small and therefore the short-run supply curve tends to be very steep. However, the long-run price sensitivity is equal to  $\varphi / \delta$ , which for relatively small values for  $\delta$  should be considerably larger than the short-run sensitivity.

9. Figure 1 depicts these relationships and illustrates how price dynamics behave following a positive (permanent) demand shock. The left panel shows what would happen if the tax treatment of housing is less generous (*i.e.* the marginal effective tax rate on net interest income is low). In that case the demand curve is relatively flat. Initially the equilibrium moves along the vertical short-run supply curve  $S_s$  from E to A. Eventually supply will expand ( $S_l$  is the long-run supply curve) towards the long-run equilibrium B. So, prices first go up and then come down again, but settle at a higher level than prior to the shock.

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2. Swank *et al.* (2002) developed a similar model for the Dutch owner-occupied housing market, making a distinction between first-time buyers and home owners who “climb the housing ladder” by exchanging their existing home for a more expensive one.

**Figure 1. The impact of a demand shock on house prices**

Source: OECD Secretariat.

10. The right panel depicts the situation when the tax treatment of housing is generous – *i.e.*  $\tau$  is large. The demand curve is now steeper because the impact of price increases on demand will be choked off by the tax break. The shock now produces a sharper initial increase in the price level and a sharper subsequent fall than in the left panel. Hence the tax break leads to more volatility in house prices subsequent to a demand shock.

11. A further observation can be made. The real capital cost is assumed to be positive, which should indeed normally be the case. However, if the positive demand shock is very large, households may anticipate future price increases and the expected capital gain  $\pi$  may be large. In that case the user cost of capital may become negative and the slope of the demand curve may turn positive. As a result the short-run equilibrium price is undetermined and the price will keep spiralling up until expectations of further price increases falter, capital costs rise, and boom turns to bust. This situation is akin to a speculative bubble.

### The impact of tax breaks on housing cost

12. In this section we estimate the real financing cost of housing and the tax wedge between the market interest rate and the financing cost of housing investment, to the extent these are affected by the personal income tax system. We consider the case where housing investment is entirely financed by borrowing. The basic features of personal income tax systems that affect the borrowing cost of housing investment are:<sup>3</sup>

- Whether the interest payments on mortgages are deductible from taxable income, and if so, whether there are limits on the deductible period or the deductible amount.
- Whether tax credits are available.
- Whether the imputed income from owner-occupied housing is taxed.

3. Obviously other parts of the tax system, such as wealth tax, property tax, taxation on real estate transactions, VAT, etc. also affect the real financing cost of owner-occupied housing. These are not considered here, but obviously constitute an interesting area for further research.

A related question to examine is whether a modest increase in inflation will lead to negative real financing cost, and hence make housing an extremely attractive investment in some countries, but not in others. If so, this may help explain why inflation divergence among euro area countries will tend to result in divergences in housing demand and property prices and, in turn, in divergent trends in housing wealth.

### **Methodology**

13. The methodology draws on earlier OECD work (Fukao and Hanazaki, 1986) and involves the following three steps:

- Make an assumption on the typical price of one unit of housing,  $P$ . This is assumed to be 6 times the disposable income of an average production worker ( $APW$ ).
- Calculate the after tax nominal interest rates,  $i_a(t)$ , while using all possible tax relief. This after-tax rate is time-dependent, due to the limited duration of tax relief in some countries. Where applicable tax relief is calculated for a single earner couple with two children.
- Convert the time series of after tax nominal interest rates  $i_a(t)$  into a single flat nominal interest rate  $i_f$ , with the same present value.

The calculation of the after tax interest rate depends on the main features of tax relief. All tax parameters refer to the 1999 tax codes reported in IBFD (1999). There are five different cases:

#### *Case 1: deduction with a ceiling but no time limit*

14. This model is applied in **Austria** and **Finland**, except that in the latter country the tax rate is not the marginal tax rate on earned income but the one on capital income (plus a small mark-up). In formal terms we find for Austria and Finland, respectively (note that the ceiling in Austria was 20000 shilling and in Finland 20000 Markka):

$$i_a = i - 0.5 \min(20000 / P, i)$$

$$i_a = i - 0.3 \min(20000 / P, i)$$

15. A variant of this model is found in **Ireland**, where the full deduction changes into a partial (80 per cent) deduction after five years.

$$i_a(t) = \begin{cases} i - 0.24 \min(5000 / P, i), & t \leq 5 \\ i - 0.8 \times 0.24 \min(5000 / P, i), & t > 5 \end{cases}$$

16. **Luxembourg** again has a similar system, but has three deduction levels, a standard level that applies after ten years, a high level in the initial five years and an intermediate level in between.

$$i_a(t) = \begin{cases} i - 0.46 \min(240000 / P, i), & t \leq 5 \\ i - 0.46 \min(180000 / P, i), & 5 < t \leq 10 \\ i - 0.46 \min(120000 / P, i), & t > 10 \end{cases}$$



*Case 2: deduction without a ceiling, no time limit and taxation of imputed rent*

17. In this model, which is applied in the **Netherlands**, the imputed rent as a fraction of the value of the unit of housing (1.25 per cent) is taxed at the top marginal rate of 60 per cent, but interest expenses are fully deductible against total income:

$$i_a = i - 0.6(i - 0.0125)$$

18. A variant of this model is found in **Belgium**, where interest payments are deductible against the imputed rent income only:

$$i_a = i - 0.58 \min(i - 0.0125, 0)$$

*Case 3: deduction of a fixed fraction of the acquisition value, subject to a ceiling and a time limit*

19. This system is applied in **Germany**, where during the first eight years 5 per cent of the acquisition cost that may be deducted up to an annual ceiling of 5000 DM:

$$i_a(t) = \begin{cases} i - 0.53 \min(0.05, 5000/P), & t \leq 8 \\ i, & t > 8 \end{cases}$$

*Case 4: no tax relief*

20. The **French** system has no tax relief, so the after tax interest rates is equal to the market rate, *i.e.*

$$i_a = i$$

21. The **Greek** system is also in this category, but it also taxes the imputed rent (3.5 per cent of acquisition cost) at the top marginal rate of 45 per cent:

$$i_a = i + 0.45 \times 0.035$$

*Case 5: tax credit with indefinite duration*

22. **Italy** and **Portugal** apply a relatively simple system with the credit amounting to, respectively, 19 and 20 per cent of the financing cost subject to a ceiling of, respectively 1330000 lire and 100000 escudo:

$$i_a = i - \min(1330000/P, 0.19i)$$

$$i_a = i - \min(100000/P, 0.30i)$$

23. **Spain** has a much more complex system, with 25 per cent (20 per cent after two years) of the financing cost up to 750000 ptas credited, and 15 per cent of the following 750000 ptas credited:

$$i_a(t) = \begin{cases} i - \gamma(t)i, & iP \leq 750000 \\ i - \gamma(t)750000/P - 0.15(i - 750000/P), & 750000 < iP \leq 1500000 \\ i - \gamma(t)750000/P - 0.15 \times 750000/P, & iP > 1500000 \end{cases}$$

$$\gamma(t) = \begin{cases} 0.25, & t \leq 2 \\ 0.20, & t > 2 \end{cases}$$

### *Calculation of the marginal tax effective tax rates*

24. To calculate the equivalent flat rate financing cost  $i_f$  the procedure is as follows. The following basic relationship should hold:

$$\int_0^{\infty} i_f P e^{-(i-\pi)t} dt = \int_0^{\infty} i_a(t) P e^{-(i-\pi)t} dt$$

where  $\pi$  is the inflation rate. From this the three relevant cases can be derived (constant regime over time, one change and two changes within the regime). Under the first case, it must follow that:

$$i_f = i_a$$

If there is one change over time the following must hold:

$$i_f = i_{a1} + (i_{a2} - i_{a1})e^{-(i-\pi)t_1}$$

where  $i_{a1}$  and  $i_{a2}$  denote, respectively, the financing cost before and after  $t_1$ . In the third case we find:

$$i_f = i_{a1} + (i_{a2} - i_{a1})e^{-(i-\pi)t_1} + (i_{a3} - i_{a2})e^{-(i-\pi)t_2}$$

where  $i_{a3}$  is the financing cost after  $t_2$ .

25. The real financing cost is found by simply subtracting the inflation rate  $\pi$  from the nominal financing cost  $i_f$  and the tax wedge by subtracting the pre-tax interest rate from the nominal financing cost, *i.e.* if it is negative the tax system provides a subsidy.

### *Simulation results*

26. The results are summarised in Table 1 and Figure 2. From the computations it emerges that the real cost of financing is generally lowest in the smaller euro area economies, except for Greece. The real financing cost was in 1999 below 1 per cent in the Netherlands, between 1 and 2 per cent in Ireland and Spain, and above 2 per cent elsewhere (middle panel). For the tax wedge the following picture emerges (upper panel). It is clearly negative (*i.e.* the tax system subsidises housing) in the Netherlands, Portugal, Luxembourg, Ireland, Spain, Finland, Austria and Italy but it is (virtually) zero in Germany, Belgium and France. In Greece housing is heavily taxed (which serves to offset loopholes and tax evasion in other parts of the system).

**Table 1. The tax wedge for housing: simulation results**

	AUT	BEL	FIN	FRA	DEU	GRC	IRL	ITA	LUX	NLD	PRT	ESP
Deduction limit (thousands)												
First period	20	..	20	..	5	..	5	1 330	240	..	100	..
Second period	..	..	..	..	..	..	5	..	180	..	..	..
Third period	..	..	..	..	..	..	..	..	120	..	..	..
Imputed rent (% of value)	..	1.25	..	..	..	3.50	..	..	..	1.25	..	..
Interest rate	4.68	4.71	4.72	4.62	4.49	6.31	4.77	4.73	4.67	4.63	4.78	4.73
Marginal tax or credit rate	0.50	0.58	0.30	..	0.53	0.45	0.24	0.19	0.46	0.60	0.30	0.25
Cost of financing												
First period	4.12	4.71	3.82	4.62	4.49	7.88	3.83	4.20	3.71	2.60	4.55	3.79
Second period	..	..	..	..	4.49	..	3.85	..	3.50	..	..	3.80
Third period	..	..	..	..	..	..	..	..	3.89	..	..	..
Inflation	0.51	1.13	1.31	0.56	0.64	2.14	2.46	1.65	1.02	2.03	2.17	2.23
Real cost of financing	3.60	3.58	2.52	4.05	3.85	5.74	1.37	2.55	2.69	0.57	2.38	1.56
Tax wedge	-0.56	0.00	-0.90	0.00	0.00	1.58	-0.94	-0.53	-0.96	-2.03	-0.23	-0.93

Source: OECD Secretariat.

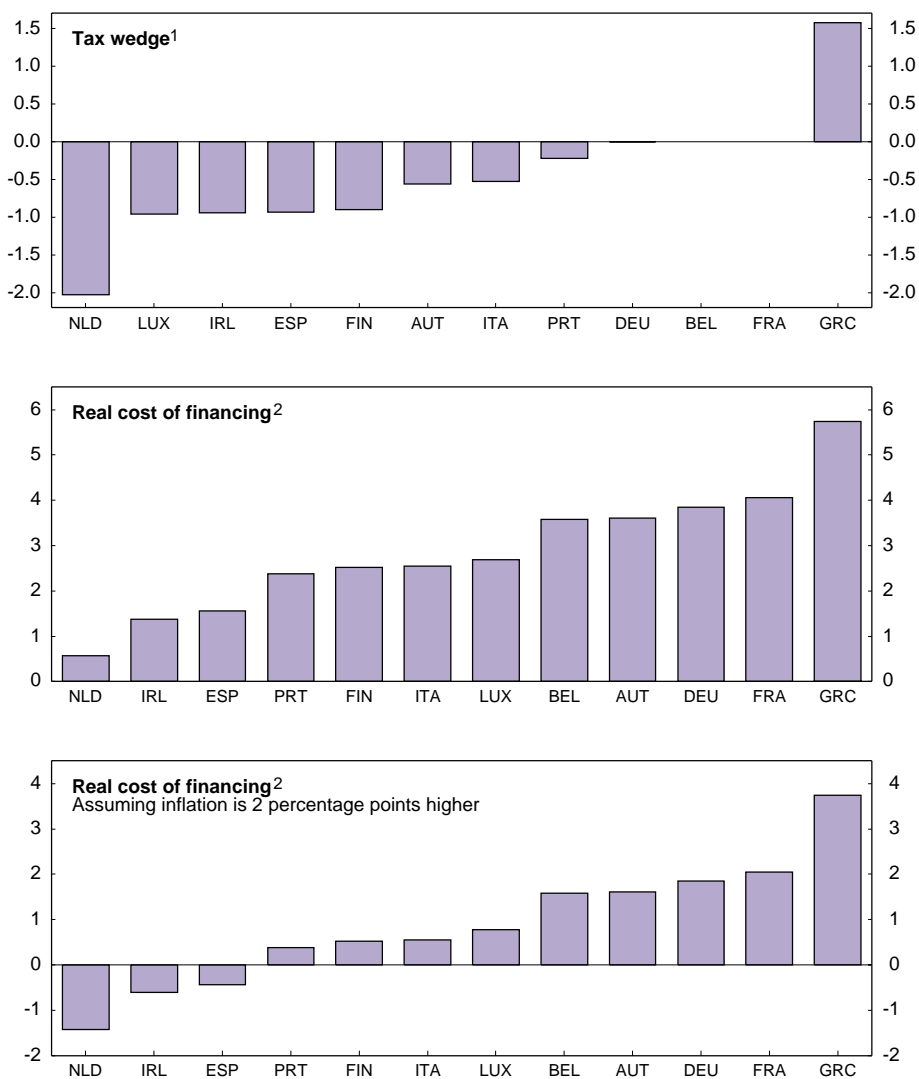
27. A simulation of a 2 per cent points increase in inflation from their actual 1999 levels (Figure 2, lower panel), shows that the real financing cost of housing becomes negative in three countries: the Netherlands, Ireland and Spain.

28. The theoretical model suggests that price variability of owner-occupied homes would be largest in countries where the tax breaks for owner-occupied housing are largest. Regressing the marginal effective tax wedges on owner-occupied housing in euro area countries on the variability of house prices (gauged by the standard deviation of the house price index, 1995 = 100, since 1970) confirms this (Figure 3). More than half of the variation in the standard deviation across euro area countries is explained by the tax wedge on housing. The most striking example is the Netherlands, which combines the largest tax breaks with the second largest price variability. There is a middle range containing Ireland, Spain and Finland, and the least prone to price variability with the smallest tax breaks are Austria, Italy, Portugal, Belgium, France and Germany.

29. Finally, Table 2 shows that countries that rank high in terms of the amount of tax subsidies available for owner-occupied housing also rank high on volatility of real house prices, as well as on levels of mortgage debt and inflation. In these countries property prices may rise to unsustainable levels and if financial supervision arrangements and prudential standards are not sufficiently robust, financial stability problems may result. This concern has recently prompted the ECB (2003) to call for increased monitoring of the evolution of households' indebtedness and financial fragility and for strengthening the role of risk assessment procedures.

**Figure 2. The impact of taxation on housing cost**

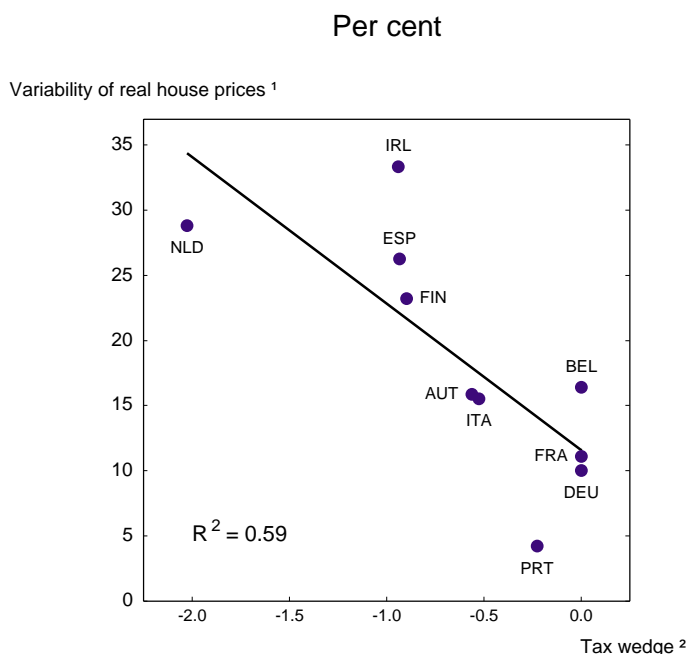
Per cent



1. Difference between after-tax and pre-tax real interest rate on mortgage loans; 1999 tax rules, interest rates and inflation.

2. Real after tax interest rate on mortgage loans; 1999 tax rules, interest rates and inflation.

Source: OECD Secretariat.

**Figure 3. Correlation between the tax wedge and variability of house prices**

1. Standard deviation, 1970-2001.

2. Difference between after-tax and pre-tax real interest rate on mortgage loans; 1999 tax rules, interest rates and inflation.

Source: OECD Secretariat.

### Concluding remarks

30. The apparent divide between small and large countries in the euro area appears to be related in part to the difference in tax treatment in owner-occupied housing. Income tax systems in the smaller euro area countries are conducive to volatile house prices and this may have been interacting with the generally higher inflation rates (and hence lower real interest rates) observed in these countries since the advent of the common currency. The extent to which this has led to a housing “bubble” in these countries is difficult to ascertain at this stage given the short existence of the common currency, but there are indications that at least in some countries house prices may have peaked. In “normal” times the differential tax treatment of housing in EMU is a concern because it may contribute to “asymmetric” transmission of monetary policy. To the extent tax systems contribute to the occurrence of housing bubbles it may be a concern also for macroeconomic stability for the area as a whole.

**Table 2. Structural features of housing markets and inflation differentials**

Per cent, countries ranked according to the size of the tax advantage

	Tax wedge <sup>1</sup>	Variability of real house prices <sup>2</sup>	Mortgage debt as a share of GDP <sup>3</sup>	Loan to value ratio	HICP inflation <sup>4</sup>
Netherlands	-2.03	29	74	112	3.4
Ireland	-0.94	33	30	60-70	4.1
Spain	-0.93	26	32	80	3.0
Finland	-0.90	23	21	75-80	2.2
Austria	-0.56	16	30	60	1.6
Italy	-0.53	16	10	..	2.3
Portugal	-0.23	4	47	70-80	3.3
Germany	0.00	10	47	70	1.4
Belgium	0.00	16	28	80-85	1.9
France	0.00	11	22	..	1.5

1. Difference between after-tax and pre-tax real mortgage interest rate, 1999.

2. Standard deviation, 1970-2001.

3. 2001.

4. Average 1999-2002.

Source: BIS, ECB and OECD Secretariat.

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