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HOUSE PRICES AND ECONOMIC ACTIVITY

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Nathalie Girouard and Sveinbjörn Blöndal

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ABSTRACT/RÉSUMÉ

House Prices and Economic Activity

This paper reviews the role of house prices in influencing private consumption and residential investment in OECD countries. Deregulation of the mortgage markets in most OECD countries since the 1970s has made it easier for households to borrow for current consumption on the basis of their housing wealth, and the easing of borrowing constraints has often been accompanied by sizeable withdrawal of housing equity. The analysis presented in the paper and a review of existing empirical work for the major OECD countries suggest that house prices have a significant positive impact on private consumption through wealth effects and/or an easing of liquidity constraints. House prices also influence the profitability of house building, and in many countries there is a close association between profitability of house construction and private residential investment. A corollary of these results is that residential property prices can be useful indicators of demand pressures in the economy.

Jel classification: E21, D12, D91
Keywords: consumption, wealth, house prices

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Ce document examine dans quelle mesure les prix des logements influencent la consommation privée et l'investissement résidentiel dans les pays de l'OCDE. Depuis les années 1970, la déréglementation des marchés hypothécaires dans de nombreux pays de l'OCDE a allégé les contraintes visant les emprunts des ménages pour la consommation courante en fonction de leur situation de patrimoine. L'accès élargi des ménages au crédit a souvent été accompagné de prélèvements massifs sur la valeur immobilière. De l'analyse présentée dans cette étude et de la description des travaux empiriques existant pour les principaux pays de l'OCDE, il ressort une incidence significative et positive des prix des logements sur la consommation privée à travers des effets de richesse et/ou par suite d'un assouplissement des contraintes de liquidité. Les prix immobiliers influencent aussi la rentabilité de la construction de logements et dans plusieurs pays, il existe un lien étroit entre l'indicateur de rentabilité de la construction et l'investissement résidentiel. En conséquence, les prix immobiliers peuvent être d'utiles indicateurs des pressions excédentaires de la demande dans l'économie.

Classification JEL : E21, D12, D91
Mots-clés : consommation, richesse, prix des logements

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HOUSE PRICES AND ECONOMIC ACTIVITY

Nathalie Girouard and Sveinbjörn Blöndal[1]

1. In many OECD countries, movements in real house prices have been closely correlated with the business cycle. Strong increases in property values were associated with the overheating in the late 1980s in several countries, and are widely considered to have fuelled an unsustainable expansion in demand. With house prices rising more rapidly than most other prices in several Member countries in the second half of the 1990s, their potential macroeconomic impact is again becoming an important issue. In the United States, for instance, the contribution of real estate developments to the current economic expansion has been emphasised recently; house price developments are being scrutinised in the United Kingdom as advanced indicators of demand pressure; in several smaller European countries, the potential impact of booming property values on consumer spending has been a matter of concern.

2. This paper examines the role of house prices in influencing consumption and residential investment in OECD countries. The principal conclusion of the paper is that house prices have significant impact on private consumption through either wealth effects or an easing of households' liquidity constraints. They may also have important effect on private residential investment in some countries though such conclusions are more tentative. Because of the link between house prices and aggregate demand, property prices can be useful indicator of demand pressures in the economy.

3. The paper is organised as follows. Section I documents the development of inflation-adjusted house prices since the 1970s in selected OECD countries where data are available. Section II reviews the principal *a priori* mechanisms through which changes in property prices could affect demand, emphasising the importance of the financial system as a conduit in this process. Section III assesses how changes in mortgage markets since the early 1970s are likely to have affected the link between property prices and demand. Section IV reviews existing empirical work and presents regression results concerning the impact of property prices on consumption for six of the G7 countries. Section V briefly assesses to what extent private residential construction is associated with house prices. A final section discusses the policy implications of the findings of the paper.

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I. House price development in selected OECD countries since 1970[2]

4. House price developments[3] in most OECD countries have been characterised by cyclical fluctuations around an upward trend (Figure 1). The annual trend rate of growth of inflation-adjusted house prices (nominal prices deflated by the consumer price index) has varied considerably across the 16 OECD countries for which data are available.[4] It has exceeded 2.5 per cent in the United Kingdom, the Netherlands, Spain, Ireland and Norway, while it has been below 1 per cent in Germany, Italy, France and Sweden. The length of the house price cycle has also varied somewhat across countries but is typically around 10 years. Hence, three broad cycles can be identified since 1970, each starting from a trough early in each decade.

(Figure 1. Real house price developments, 1970-1999)

5. The amplitude of house price fluctuations has differed markedly across countries and over time within countries (Figure 2). Measured as the standard deviation of the annual growth rate of real house prices, fluctuations over the 1970-1999 period have been particularly strong in Italy, Spain, Japan, Finland, the United Kingdom and the Netherlands. By contrast, the fluctuations have been comparatively small in the France and, especially, the United States. In several countries (Australia, Canada, Denmark, Finland, France, Spain, Sweden) the 1980s cycle was more pronounced than the 1970s and 1990s cycles. However, the variability in growth rates fell in the 1980s in Japan and a few European countries (Germany, Netherlands and the United Kingdom). In practically all the countries under review, the standard deviation of the growth rate of real house prices was lower in the 1990s than for the 1970-1999 period as a whole.

(Figure 2. Volatility of growth in inflation-adjusted house prices)

6. The scale of house price cycles is well illustrated by cumulative increases and decreases in property prices in the course of a cycle. Some of the more prominent movements include:

- In Japan, inflation-adjusted property prices rose by close to 75 per cent in the five years to 1990 and fell by a third since then.

- In Italy, real house prices increased by 56 per cent in the 1988-1992 period. In the previous upturns (1975 and 1979-81) prices had risen by around 40 per cent in real terms.

- In the United Kingdom, inflation-adjusted house prices rose by more than 50 per cent in 1972 and 1973, only to fall by 30 per cent in the subsequent four years. In the latter part of the

2. Data on house prices for 16 countries have been provided by the Bank for International Settlements.

3. Data on residential property prices are not strictly comparable across countries due of differences in definitions. In the majority of countries, the house price index covers house prices on a national basis. However, in Australia, the index refers to a weighted average of capital cities and regional areas, whereas in Germany, the index refers to the price of houses located in Western Germany. In Japan, the price index refers to residential land prices. Furthermore, in some countries the index relates to prices of existing and/or new housing, to prices of houses for owner-occupation only or also to prices of second residences, to prices of housing for which a loan has been applied for only or is a mix-adjusted house price index taking into account several differences in property type.

4. House price developments are examined at the national level, and abstract from regional house price dynamics which can be very large. In the United States, for example, major desynchronised swings occurred successively in the Mid-West, the North-East and the South-West during the 1980s. Similarly, London and Paris have seen booms and busts, which are diluted in the countrywide measures.

1980s, house prices rose by more than two-thirds in a period of four years, and then fell by more than 20 per cent in the five years to 1994.

- In the Netherlands, real property prices rose by around 75 per cent in the 1975-78 period, and then fell by 50 per cent by the mid-1980s. The cumulative increase in real house prices since 1993 is more than 50 per cent.

- In Denmark, real property prices fell by a third in the three-year period to 1982 and then covered lost ground in the subsequent four years, only to fall back again by a third in the 1987-93 period.

- In Sweden, the first half of the 1980s was marked by a decline in real property prices of one third. The increase in real house prices of some 30 per cent in the closing years of the 1980s was fully offset in the first half of the 1990s.

- In Finland, an increase of more than 50 per cent in the three years to 1989 was followed by a 45 per cent fall in the subsequent four years.

- In Norway, a 45 per cent increase in inflation-adjusted property prices took place in the three years to 1987, but this gain was more than offset in the ensuing period to 1993.

- In Ireland, after comparatively mild increases and decreases in property values in real terms up to the 1990s, real property prices have more than doubled since 1993.

- In Spain, real house prices rose by 120 per cent in the five years to 1991.

By contrast, house price fluctuations have been less pronounced in the United States, Germany and France. Indeed, the increase in property values in the United States in the upswing in the 1980s amounted to less than 20 per cent and in the 1990s it was less than 10 per cent.

7. In many OECD countries, changes in real house prices appear to be closely correlated to business cycles as measured by OECD Secretariat output gap indicators (Table 1). Falling property values have accompanied recessions in Japan and some European Union countries since the early 1980s. Conversely, the overheating in the late 1980s in the United Kingdom and some of the Nordic countries was associated with sustained growth of inflation-adjusted real estate prices. Statistical correlations suggest strong links, in particular in the United Kingdom, Canada, Germany, Spain and some of the Nordic countries over the 1970-1999 period. For France, Japan, and Italy the correlation coefficients are significant for the period since 1980.

(Table 1. Correlation of the growth of real house prices and output gaps)

8. Since the mid-1990s, real house prices have grown rapidly in the United Kingdom, Ireland, the Netherlands, the Nordic countries and Australia. Sustained, if more moderate, price increases have also taken place in the United States. The cumulative rise in house prices in these countries has been associated with strong economic expansion, with most of them now operating near or above full capacity. In contrast, the housing market has been weak in a few countries during this period. In Japan, real residential property prices have continued their gradual but steady decline since 1990. In Germany the housing market is still suffering from the hangover following the unification boom and from the withdrawal of tax subsidies which were introduced in the early 1990s.

II. From house prices to economic activity: possible transmission mechanisms

9. The movements in property prices discussed above could affect aggregate demand and economic activity in various ways.[5] It could affect private consumption if households regard their property as wealth and if spending decisions are influenced by net asset positions. Private consumption can also be influenced by property prices if households are liquidity constrained and their access to credit is dependent on housing wealth or equity. In addition, changes in property prices can influence private residential construction by making it more or less profitable to build new houses.

Private consumption and housing wealth

10. Analysis of the role of wealth for private consumption goes back to the permanent income hypothesis or the life-cycle model (Friedman, 1957, Ando and Modigliani, 1963). Within this framework, the level of household consumption is a function of permanent income, which is the present value of labour income (human wealth) and capital income (non-human wealth). The latter includes in principle housing wealth and financial wealth, with housing wealth often being the single most important component of the asset side of household's balance sheets. Overall, the relative weight of real estate has fallen somewhat in the 1990s as a result of the sharp increase in the price of equities and other financial assets, but it still accounts for 20 per cent of total gross household assets in the Unites States and Canada, and between 30 to 40 per cent in the major European countries (Japan, at 10 per cent, is an exception to this picture) (Table 2). Given expected permanent income, households are assumed to spend evenly over their life times, borrowing in early age, saving during the middle of their working lives and dissaving in the later years. An unexpected increase in financial wealth, for instance, should therefore push consumers to spread the wealth gain over the reminder of their life times, consuming a bit more and saving a bit less.

(Table 2. Household assets)

11. This effect is not so clear-cut for housing wealth. Owner-occupiers may perceive house price increases as an addition to their wealth, and reduce their saving out of current income. It is also possible that owners do not feel wealthier when the value of their property goes up since their implicit rental costs have gone up as well. However, in this case the increased implicit rental cost could induce the owners to trade down and the resulting housing equity withdrawal could be used to increase consumption. Households planning to purchase their own homes may however reduce their consumption in the wake of higher house prices as they will have to save more for higher down-payments and repayments. For these reasons, the strength of the wealth effect is uncertain.

12. Even if households regard their property to be wealth, their capacity to adjust current spending in response to shifting house prices is strongly dependent on the functioning of the financial system. This is notably the case when rising property values would encourage households to increase their current spending. To fund such spending increases consumers would have to draw down other liquid assets or to borrow. If they do not have "deep pockets" or their assets cannot be used (as may be the case with retirement savings), borrowing would be the only option to translate desired into actual consumption increases. Should credit for this purpose not be forthcoming, households would be constrained in responding to higher house prices.

5. See Miles (1995) for a comprehensive coverage of issues related to the housing markets and their macroeconomic impact.

13. An easing of credit constraints would in this case tend to "activate" the housing wealth effect. Indeed, households with excess housing wealth would respond to this new environment by withdrawing equity from housing through borrowing and increasing their consumption. During this adjustment period the saving ratio would temporarily fall and then increase as households had adjusted their current spending to their wealth position. In this transition period the wealth effect would be operating even if property prices remain unchanged; after the transition is completed the wealth effect would only change consumption when net asset positions were changing.

Private consumption and borrowing capacity

14. To the extent they influence the borrowing capacity of households, changing house prices may influence private consumption even if wealth effects are absent. Credit rationing was often an inherent feature in a system that fixed interest rates at low levels. But rationing at the margin may also be a feature of a market-based system for reasons such as asymmetric information between borrowers and lenders (see Deaton, 1991) for a review of arguments for credit constraints). In practice, households' ability to borrow is strongly dependent on their capacity to supply assets that can serve as a security for repayments and real estate is the most widely used collateral asset. By increasing borrowing secured on rising property values, households can withdraw part of the rise in housing equity and use some of the proceeds to finance extra consumption.

Private residential investment and the profitability of construction

15. Residential investment may be determined by the difference between house prices and the cost of constructing an additional unit.[6] When the ratio between prices and costs, the so-called Tobin's q, is above unity, it is profitable for individuals and property developers to construct new houses: the new units can be sold at the price established in the housing market at a premium over the costs determined in factor markets. On the other hand, a Tobin's *q* ratio of less than unity implies that it is not profitable to construct new houses and residential investment will accordingly fall. In long-run equilibrium, the ratio between house prices and construction costs (including normal rates of return on capital) must be unity.

16. The *q* framework may not be adequate in explaining residential investment in the presence of financial constraints.[7] There is growing evidence that the investment activity of firms in general is highly dependent on cash flow and the availability of funds, perhaps reflecting inherent imperfections in financial markets.[8] Given that construction companies are typically highly leveraged, they may be particularly vulnerable to any changes in lending practices of financial institutions. Moreover, as real estate borrowing is generally secured on the value of property, the willingness of lenders to provide funds may be directly related to changes in property prices. In particular, the loss in collateral value as the real estate market shows signs of weakening may result in an abrupt tightening of credit, forcing sharp cuts in building activity.

6. See *e.g.* Poterba (1984) and Topel and Rosen (1988).

7. It is still useful when the constraints are limited to ultimate homebuyers. In this case, an easing of the constraint will increase the effective demand for home ownership and drive up house prices in the secondary market, which then creates a profit opportunity for developers to construct new houses.

8. See *e.g.* Hubbard *et al.* (1995).

III. Deregulation of the mortgage market

17. The mortgage market holds the key in the transmission of changes in property prices to aggregate demand. As discussed above, incipient wealth and borrowing-capacity effects may be neutralised if credit availability is restricted, and the same holds for the impact of property prices on residential investment. This section reviews changes in the mortgage markets of selected OECD countries since the early 1970s and how this may have influenced borrowing constraints on households.

Before the 1980s, credit constraints were prevalent in mortgage markets in many countries

18. Until the 1980s the mortgage market in most Member countries was highly regulated and competition was weak. Mortgage activity was dominated by specialised institutions that operated with dedicated sources of funds and enjoyed either a monopoly of such funds or significant tax or funding subsidies. Each mortgage market tended to be tightly regulated by national authorities. Regulations included the fixing of lending and deposit interest rates, quantitative limits on mortgage credit extension, ceilings on permissible loan-to-value ratios and repayment periods, and a prohibition of the granting of credit for current spending. These regulations resulted in chronic or temporary credit rationing in the mortgage market, and made it difficult for households to increase consumption in the wake of higher property prices.

19. For instance, in the United States, thrift institutions (savings and loan associations) dominated the mortgage market. Thrifts were constrained by regulation and provided incentives through tax advantages to invest almost exclusively in fixed-rate, level-payment mortgages funded by insured deposits. Regulation Q imposed a maximum interest rate on deposits, and the funding of mortgage lending was adversely affected when money market rates exceeded these limits.

20. The building societies in the United Kingdom experienced little competition during the 1970s and, in consultation with the government, operated a cartel system, which rationed supplies of mortgage credit. In France, quantitative credit controls and interest rate ceilings restricted the flow of mortgage credit. A high level of specialisation and compartmentalisation in the banking system limited entry of banks and other financial institutions into the housing credit market. In Italy, quantitative ceilings on bank loans and regulatory demarcation between short and long-term lending banks imposed important restrictions on banks' activities as only the special mortgage credit institutions, funding themselves through mortgage bonds, were allowed to grant long-term mortgage loans. In some Nordic countries (Finland and Norway), administrative measures were employed to allocate credit to households and other sectors in an environment where post-tax real interest rates on mortgage loans were often negative, reflecting low administered interest rates and tax deductibility of interest payments. In Denmark, mortgage-financed household spending was constrained by high down-payment requirements and comparatively short repayment periods for second mortgages and mortgages for second-hand property transactions.

21. In Australia, the banking system was highly regulated; there were controls on banks' deposit and lending rates and on the composition of banks' balance sheets. These controls constrained banks in the ability to make additional mortgage loans (Kent and Lowe, 1998). In New Zealand, credit allocation guidelines and interest rate controls contributed to limit access to credit.

Reforms since the 1980s have significantly reduced borrowing constraints on households

22. Financial market reforms since the early 1980s have increased households' access to mortgage credit (Table 3). The process of liberalisation was not uniform and there was no single model of the deregulation process across countries. In some cases it contributed to macroeconomic fluctuations as both

policymakers and market participants went through a learning process as they adapted to the new environment. In the United States, the United Kingdom, the Nordic countries, Australia and New Zealand, the process was relatively quick and was almost completed by the mid-1980s. In some continental European countries and Japan, deregulation tended to be less comprehensive and slower.

(Table 3. Selected financial deregulation and liberalisation measures affecting the housing market)

23. In the countries where liberalisation was completed by mid-1980s, competition in the mortgage market rose as new entrants fought to gain market share:

- In the United States, the phasing out of regulation Q eliminated periodic funding constraints in mortgage lending. Together with lower tax advantages for the traditional savings and loans institutions, it prompted banks and other financial institutions to enter the mortgage market. Such entry was also strongly encouraged by the development of the secondary mortgage market, which greatly facilitated the funding of long-term mortgage lending by institutions that had typically relied on short-term deposits for their lending activity. By the late 1980s, non-traditional lenders accounted for 60 per cent of total mortgage origination, *i.e.* direct lending to households, compared with 45 per cent in the late 1970s; by the late 1990s this share had risen to 80 per cent. Their share in outstanding home mortgages reached 70 per cent in the late 1980s and 90 per cent by the late 1990s. This process was accompanied by the introduction of new mortgage instruments, such as variable-rate mortgages, that made such borrowing more accessible for households. It was also accompanied by an easier lending policy as demonstrated by the rise in the average loan-to-value ratio from 0.72 in the late 1960s to 0.75 in the late 1980s and further to 0.79 in the late 1990s.

- In the United Kingdom, the abolition of credit controls (the “corset”) in 1980 paved the way for banks’ entry into the housing loan market. This in turn broke up the cartel between building societies concerning interest rates, adding to competition pressures in the mortgage market. In 1986 the prohibition of the granting of mortgage credit for current spending was lifted. By the end of the 1980s, the market share of the traditional building societies had fallen to 60 per cent compared with 80 per cent at the beginning of the decade. The increased competition prompted lender to considerably reduce down-payment requirements: the loan-to-value ratio rose from 0.60 in the late 1970s to 0.68 in the late 1980s. In the late 1990s, it had risen further to 0.72.

- In the Nordic countries, the impact of financial deregulation has been particularly strong on the housing market as it was accomplished within few years and in conditions when tax systems gave strong incentives to borrow. The lifting of lending and deposit rate ceilings opened the way to more competition by facilitating entry of banks and other financial institutions into new segments of the credit market.

- In Canada, ceiling on interest rates on loans and restrictions on commercial banks' involvement in mortgages financing were abolished in 1967, permitting banks to invest in non-insured mortgages. Since then, there has been relatively strong competition between banks and trust and mortgage loan companies in the market for mortgages. The banks’ share of the residential mortgage market (including securitised mortgages) climbed steadily from 10 per cent in 1970 to about 55 per cent in the late 1990s Freedman (1998).

- In Australia and New Zealand, credit controls were removed in the early 1980s. Most interest rate ceilings were abolished in 1985 and entry barriers into the banking sectors removed by the late 1980s.

In general, these countries experienced rapid growth of mortgage credit in the wake of deregulation (Figure 3). This sharp increase in the second half of the 1980s resulted both from a catching-up after the constraints during the credit-controlled period, and from an active strategy pursued by banks in search of a larger market share. As became evident later, many institutions over-extended mortgage credit in the new competitive environment. Indeed, most of the countries suffered serious problems with mortgage loans, requiring costly public interventions (see Edey and Hviding, 1995).

(Figure 3. Net mortgages in selected countries)

24. In Germany, the financial system was largely liberalised in the early 1970s, with all interest rate restrictions having already been removed in 1967. However, competition in the funding side of the banking sector remained somewhat distorted given that public-sector financial institutions, accounting for a large share of the residential mortgage market, benefit from advantageous financing conditions due to perceived public guarantees.

25. In a number of other countries the reform process was less comprehensive and competition pressure less intense in the mortgage market:

- In France, deregulation allowed commercial banks to compete in the mortgage market after 1987, but restrictions on interest rates remained for a longer period. Although market-driven lending became the rule, funding sources were not completely competitive, and public-sector financial intermediaries still enjoy significant advantages. Until mid-1999, the Crédit Foncier de France, the main state housing loan institution, had the monopoly right to issue mortgage bonds.

- In Italy, quantitative ceilings on bank loans were abolished in 1983 but re-imposed temporarily in 1986 and 1987. In 1994, important restrictions on activities in the banking sector were eliminated and all types of credit institutions were allowed to operate on the mortgage market and grant long-term loans. Banks are nonetheless subject to various procedural and lending restrictions on their mortgage activity, limiting their possibilities to engage in mortgage lending.

- Japan took a gradual path to deregulate its financial market. Interest rate deregulation began in the early 1980s but was not completely eliminated until the mid-1990s and credit controls were lifted gradually in the early 1990s. However, in the second half of the 1980s, the mortgage market was strongly influenced by abundant liquidity due to the relaxed monetary policy. They lent to housing loan corporations (*jusen*), which were active in mortgage financing and contributed to expand property loans substantially.

Common to these countries is that mortgage credit has not risen nearly as fast as in the reforming countries in the mid-1980s. In Japan, large-scale mortgage lending in the late 1980s related to ample liquidity in the financial system.

26. Partly reflecting the uneven progress in liberalising mortgage markets, the terms and conditions on mortgage loans vary considerably across countries (Table 4). For example, normal maximum loan-to-value ratios range from 50 per cent in Italy to 100 per cent in the United Kingdom, the standard length of mortgage loans varies from 15 years in France, Italy, Finland and Greece to 30 years in the United States, Denmark, and the Netherlands, and the share of variable rate mortgage loans ranges from 10 per cent to 100 per cent. While these differences are likely to reflect differing regulations and intensity of competition in mortgage market, they also mirror differences across countries with respect to legal procedures (*e.g.* the

granting of loans and repossession in the case of loan default) and differences in regulations of the rental sector.

(Table 4. Mortgage markets in OECD countries: Institutional set-up)

Reforms appear to have increased housing equity withdrawal

27. Reforms in financial markets have often been reflected in the relationship between the flow of net mortgage lending to households and households' residential investment, i.e. the extent to which households inject equity into the housing market or, in some cases, withdraw it (Figure 4). Deregulation of the mortgage market in the 1980s was accompanied by housing equity withdrawal on a large scale in the United Kingdom and Norway, and, to a lesser extent, in the United States and Sweden. While this was followed by a period of no housing equity withdrawal or housing equity injections, there has been a tendency in these countries for mortgage borrowing by households to exceed their residential investment in the latter part of the 1990s. Such equity withdrawal provides households with liquidity and may work to provide a stimulus to consumption. By contrast, in countries where the deregulation of the mortgage market has been less extensive, the household sector has been permanently injecting equity into housing, in most cases substantial amounts. Japan is an exception in this respect, but, as noted above, the large-scale housing equity withdrawal in the 1980s was primarily related to ample liquidity in the financial system.

(Figure 4. Housing equity withdrawal in selected OECD countries)

IV. The impact of housing market conditions on private consumption: empirical evidence

28. This section examines the empirical evidence for the role of housing wealth and housing equity withdrawal on private consumption. The section first reviews what existing studies have to say about this issue, and then presents results of econometric analysis for the G-7 countries for which adequate data are available.

Mixed empirical evidence in the literature

29. Recent empirical evidence on the role of housing wealth in determining consumption is mixed for the G7 countries. For the United States, Greenspan (1999) suggests a marginal propensity to consume out of housing wealth of 0.05, which is in line with consensus estimates of the propensity to consume out of stock market wealth. Brayton, Davis and Tulip (2000), report however that estimates embedded in the FRB/US quarterly model put the marginal propensity to consume out of total wealth but excluding equity holdings market at 0.032. For Japan, Ogawa *et al*. (1996) used cross-sectional data to estimate a consumption function with different types of wealth variables. The results showed statistically significant property wealth effects (land and housing wealth), with estimates of the elasticity to consume out of wealth ranging from 6 per cent to 10 per cent depending on the inclusion of other wealth variables. This translates into marginal propensities to consume out of housing wealth ranging between 0.12 and 0.20.

30. For France, on the other hand, a variety of studies provide no strong evidence of any wealth effect at all. Bonnet and Dubois (1995) found a negative effect of housing wealth on consumption. However, real house prices of Paris flats had a significant effect when the wealth variable was excluded. According to Jaillet and Sicsic (1998), the data based on house prices in Paris alone do not validate the hypothesis of a wealth effect operating in France, because the rise in house prices in Paris may not have appreciably affected the whole country. Grunspan and Sicsic (1997) suggested that the wealth effect in France might pass through commercial property prices.

31. For Italy, little evidence of housing wealth effects is presented in the literature. Rossi and Visco (1995) provide evidence of a marginal propensity to consume out of total wealth of the order of 0.03 to 0.035 per cent, once account is taken of double counting of social security transfers in the measurement of disposable income and pension wealth. Brandolini and Parigi (1997) found statistically significant wealth effect, with elasticities in the order of 2 to 5 per cent.

32. In the United Kingdom, many studies have attempted to link consumption behaviour with the developments in the housing market (for a survey, see Church, Smith and Wallis, 1995). The London Business School (LBS), the Treasury (HMT), Oxford Forecasting (OEF), Goldman Sachs (GS), Business Strategies (BSL) and Shearson Lehman Brothers (SLB) all include different measures of the value of the housing stock in their models. In the HMT, OEF and SLB models this is added to net financial wealth to give a total wealth measure, while in the LBS, GS, and BSL models these two components are allowed to have separate influences. The LBS is alone in expressing housing wealth net of mortgage debt. The estimated long-term housing wealth elasticity ranges from 6 per cent in the LBS model to 15 per cent for the BSL model, while for financial wealth it varies between 6 per cent for the GS model and 9 per cent for the LBS model. Corresponding estimates of marginal propensity to consume out of housing wealth range between 0.02 and 0.08.

33. In Canada, empirical studies generally support the view that wealth is an important variable in explaining long-term movements in consumption. Bérubé and Côté (2000) included a measure of personal net worth to examine the long-term determinants of the saving rate as defined in the National Income and Expenditure Accounts. Although the ratio of net worth to disposable income played a relatively modest role prior to 1990, its rise between 1990 and 1997, boosted by capital gains on equities,[9] is estimated to have contributed to reduce the saving rate by about 2 percentage points. Using five different estimation procedures, the estimated long-term net worth elasticities are quite similar, ranging from 2 per cent to 4 per cent. Corresponding estimates of marginal propensity to consume out of net worth range between 0.004 and 0.009.

34. Existing studies concerning the role of housing equity withdrawal are largely confined to the United Kingdom. In recent studies Paterson (1993), Westaway (1993) and Miles (1995) used the flow of housing equity withdrawal to explain consumption behaviour and found an important role for such effects. The study by Miles indicated that 80 per cent of all housing equity withdrawal found its way into higher current spending. Westaway modelled four individual components of housing equity withdrawal and estimated their effects on consumption. His main results showed that it is the "quasi-credit" component,[10] which has amplified the economic expansion during the 1980s and has intensified the slump in the early 1990s. Similarly, Maclennan (1990) who studied the uses of further advances on household existing mortgages reported a high propensity to consume. Studies on the impact of other components of housing equity withdrawal on current household spending point to different effects. Thus, last time selling and trading down are found to have only modest effects (Hamnett *et al.,* 1992).[11] In the United States, the close link between consumption and second mortgages is also corroborated. Poterba and Manchester (1989) analysed the balance sheets of a large sample of US households with second mortgages, and estimated that the propensity to consume out of funds raised was around 75 per cent. By contrast, Brady *et al.* (2000)

9. In recent years, households have significantly increased their holdings of equities, either through direct ownership or through mutual funds. Equities have increased sharply in value.

10. The category "quasi-credit" refers to borrowing secured on housing equity (loan for non-housing purposes, which uses the housing equity as collateral) and over-mortgaging (borrowing a higher amount than needed to cover the value of the house and the transactions costs).

11. Hamnett conducted a survey of over 10 000 households in the United Kingdom and found that around 12 per cent had inherited property. The survey revealed that around 14 per cent of the property inherited was used to buy consumption goods.

presented survey results suggesting that in 1998 and early 1999 refinancing of existing mortgages boosted consumption spending by a modest amount relative to aggregate consumption spending.[12]

An econometric study of the impact of housing wealth and equity withdrawal on private consumption

Specification

35. Research into household consumption behaviour in recent years has tended to focus on searching for long-term relationships between consumption and selected macroeconomic variables.[13] In large part, this reflects the fact that the data involved have been found to be non-stationary. This implies that conventional statistical methods cannot be used to test relationship between movements in the level of consumption and other non-stationary variables. This approach also implies that short-term movements in consumption may be driven by deviations from the long-term relationship between consumption and its fundamental determinants.

36. The approach adopted here is to examine the determinants of consumption using co-integration techniques. The results reported below are obtained by using the Granger-Engle two-step estimation strategy. Estimation results based on the Johansen co-integration technique were also analysed in order to check for the robustness of the Granger-Engle results. The Annex presents detailed results. Building on earlier OECD work, the following two alternative long-run relationships were estimated:

$$cy = \alpha + \varphi(nw) + ECT1 \qquad (1a)$$

$$cy = \alpha + \beta(fe) + \gamma(he) + \delta(ow) + ECT2 \qquad (1b)$$

where *cy* is private consumption, *nw* is household net worth, *fe* stands for financial wealth defined as financial assets minus financial liabilities, *he* for housing wealth defined as housing assets and *ow* for other wealth defined as net worth minus *fe* and *he*. All these wealth variables are in logs, and expressed as ratios to disposable income.[14] Disposable income embodies labour income, property income and transfer income. α is a constant, φ, β, γ and δ are long-term elasticities of private consumption with respect to net worth, financial wealth, housing wealth and other wealth, respectively. ECT1 and ECT2 are the residuals from the two regressions.

37. These specifications allow the identification of a long-run level of consumption in terms of wealth. It was also tested whether they should be enriched by taking into account variables that have been found to be important in previous studies:

- the interest rate to reflect substitution effects;
- the inflation rate as a proxy for uncertainty as well as the real depreciation of non-indexed financial assets.

12. In this period, about $55 billion of equity was extracted through cash-out refinancing (over-mortgaging). Survey findings suggested that about one-fifth of cash-outs was used to finance consumption.

13. See *e.g.* Boone *et al.* (1998), and Kennedy and Andersen (1994).

14. This log-linear specification is in line with most empirical studies examining the link between consumption and the stock of wealth. Alternatives would be a linear specification or relating the log of the consumption-income ratio to the un-logged wealth-income ratio, see *e.g.* Muellbauer (1994).

38. The difference between actual and long-term values can then be included, as an error correction term, in dynamic equations explaining the short-term evolution of the consumption to income ratio:

$$\Delta(cy) = \mu + \tau ECT1\,(-1) + \sum_{i=1}^{n} \gamma_i \Delta(cy)(-i) + \sum_{i=0}^{n} \nu_i \Delta(nw)(-i) + \sum_{i=0}^{n} \kappa_i \Delta(unr)(-i) + \sum_{i=0}^{n} \rho_i \Delta(ir)(-i) + \sum_{i=0}^{n} \upsilon_i \Delta(infl)(-i) \quad (2a)$$

$$\Delta(cy) = \mu + \tau ECT2\,(-1) + \sum_{i=1}^{n} \gamma_i \Delta(cy)(-i) + \sum_{i=0}^{n} \nu_i \Delta(fe)(-i) + \sum_{i=0}^{n} \lambda_i \Delta(he)(-i) + \sum_{i=0}^{n} \lambda_i \Delta(ow)(-i) + \sum_{i=0}^{n} \kappa_i \Delta(unr)(-i) + \sum_{i=0}^{n} \rho_i \Delta(ir)(-i) + \sum_{i=0}^{n} \upsilon_i \Delta(infl)(-i) \quad (2b)$$

where Δ represents the first difference operator, and ECT(-1) is the error-correction term lagged one period. Intuitively, τ should be negative so that when the ratio *cy* is moving away from its equilibrium value, it adjusts back in the next period. The larger τ is in absolute terms, the quicker the return to long-term equilibrium. Other variables that do not enter the long-term relationship, but help explain short-term adjustments, such as the fluctuations in the unemployment rate, are included in difference form. Equations (2a) and (2b) can be estimated by OLS.

Estimation Results

39. The tables below report the estimation results for six of the G7 countries (housing wealth data are not available for Germany before 1990). Panel A shows the results for the long-term relationship (or co-integrating vector) as represented by equation (1a) or (1b). Panel B summarises the results for the short-term dynamics, as in equation (2a) or (2b). The existence of a long-term relationship is tested with the Augmented Dickey-Fuller (ADF) procedure, *i.e.* testing the stationarity of the residuals. The preferred specification was chosen using the Hendry procedure, *i.e.* starting from a more general specification and eliminating progressively non-significant variables. Dummy variables were added for some countries to correct for aberrant observations. The regression results of a more general specification are also reported in the Annex.

Testing for wealth effect

40. The main estimation results for equation (1a) are presented in Table 5. With the exception of Japan, long-term relationships between consumption and net worth were found in all countries. The results suggest a long-run elasticity of consumption with respect to net worth ranging from 12 per cent for the United Kingdom to 25 per cent for Canada. Given the share of real estate in net worth, these results indicate an elasticity of consumption with respect of gross housing wealth of 4 to 6 per cent in 1998. Corresponding long-run marginal propensities to consume[15] (MPC) out of net worth (and housing wealth)

15. An easy way to approximate the marginal propensity to consume out of wealth is by using the following expression $\varepsilon(c/w) = (\Delta c/c)/(\Delta w/w) = (\Delta c/\Delta w)*(w/c) = MPC*(w/c)$, where ε is the elasticity of consumption with respect to wealth and mpc is the marginal propensity to consume out of wealth. The marginal propensity calculations were based on the average wealth-consumption ratio over the sample period.

range from 0.02 to 0.05. These results are broadly in line with the range of estimates found in the recent literature.

(Table 5. Private consumption and net wealth: regression results)

41. Housing, financial and other wealth variables were used in a second step to test for each specific wealth effects as represented by equation (1b). The housing wealth effect is significant and positive for all countries with the exception of Italy (Table 6). Financial wealth effects are found for all the countries. The interest rate has a significant impact in only three countries: the United States, Canada, and France. In the first two, it has the expected negative sign, but in France it is positive. For all countries, the inflation rate is never statistically significant.

(Table 6. Private consumption and different components of wealth: regression results)

42. The long-term relationship given by the equations implies long-term elasticities of consumption with respect to housing equity ranging between 2 per cent for the United States and 11 per cent for Canada. Corresponding MPCs out of housing wealth range from 0.02 for the United States to 0.18 for Canada. Using gross housing assets instead of housing equity improves the estimated results for some countries. Indeed, this measure of housing wealth allows a significantly higher housing wealth effect for the United States, with an elasticity of 8 per cent and a MPC of 0.05. For Canada, a somewhat lower housing wealth effect is found (Table 7). However, with this definition of housing wealth, the wealth effect for Italy is still negative. These results are broadly in line with the range of estimates found in the recent literature, though on the high side in the case of Canada.

(Table 7. Private consumption and gross housing wealth: regression results)

43. Using the Johansen co-integration technique, two significant types of co-integrating vectors were identified for all countries; one for the total wealth specification and another one for the different wealth components specification. In some cases, the coefficients in the long-run relationships were similar to coefficients estimated using the Granger-Engle technique. For example, the estimated total wealth elasticity is identical for the United States, and the housing wealth elasticity is similar for Japan, the United Kingdom, and, to a lesser extent, in the United States. In some other cases, the coefficients in the long-run relationships were above the coefficients estimated using the Granger-Engle technique and significantly higher than the ones reported in the literature.

44. The short-term relationship is satisfactory in the sense that the error correction term is always significant and with the expected sign. The change in financial wealth has a positive impact on the growth rate of consumption for all the countries under review. The change in housing wealth is statistically significant and has a positive effect for Japan, the United Kingdom and France. It has a negative effect for the United States and Italy. No short-term influence from these variables was found for Canada. However, using gross housing assets instead of housing equity allows for a significant and positive housing wealth effect for the United States and Canada. The change of the unemployment rate has a negative impact for the United States, possibly reflecting uncertainty regarding revenues.

45. All the short-term relationships pass the usual statistical tests. The associated probability numbers (*p-values*) of the specification and diagnostic tests are reported at the bottom of the different tables. Low *p-values* lead to the rejection of the null hypothesis that serial correlation exists for instance, if for example, a *p-value* lies between 0.05 and 0.01, the null hypotheses is rejected at the 5 per cent level but not the 1 per cent level.

Testing for HEW effect

46. As discussed above, equity withdrawals may have an impact on the consumption ratio. To test for the long-term impact, the level of equity withdrawal as a proportion of income (not specified in logs) was introduced in the long-term relationship (1a) or (1b). To assess its short-term effect, the same variable in first difference feeds into the short-term equation (2a) or (2b). The estimated results are presented in Table 8, and the most general specification as well as the test statistics are reported in Table A3 in the Annex.

(Table 8. Private consumption, wealth and housing equity withdrawal: regression results)

47. For the United States, Canada, the United Kingdom and France, it was not possible to reject the existence of a long-run relationship with significant positive HEW effect. Estimates of long-run semi-elasticity[16] of housing equity withdrawal are in the range of 0.004 to 0.015. However, with this specification, the housing wealth effect is significant only in France and Canada. The financial wealth effect remains significant for all the countries. For Japan, no long-term relationship was found at all with the HEW variable.

48. The smaller parameter estimates for the HEW variable than the one found in Miles (1995) and Westaway (1993) which also included wealth variables could reflect different constructions of time series data. Recent work in the United States suggest that cash-out refinancing activity in 1998 and early 1999 has likely boosted consumption spending, but by only a small amount relative to aggregate consumption spending (Brady *et al*., 2000).

49. In the short-term relationship, the error correction term is always significant and with the expected sign. The change in HEW has a positive and significant impact on the growth rate of consumption for all four countries. The estimated elasticities range from 0.004 to 0.009. The change in financial wealth is significant for the United States and France. The change in housing wealth is significant and has a positive effect for Canada and France, and a negative effect for the United States.

50. Housing equity withdrawals may only have a short-term impact on consumption. To assess its short-term effect, the HEW variable feeds only into the short-term equation. An aggregate wealth variable (net worth) was used in this specification (Table 9). In the short-term relationship, the change in HEW has a positive and significant impact on the growth rate of consumption for all four countries confirming the robustness of previous results. The estimated semi-elasticities range from 0.004 to 0.008. Again for Japan, no short-term relationship was found with the HEW variable.

(Table 9. Private consumption: short-term relationship with net wealth and housing equity withdrawal)

16. The semi-elasticity of HEW refers to the variable expressed in natural units as opposed to a logarithm form.

V. House prices and residential investment: Empirical analysis

51. This section explores the empirical link between private residential construction and an indicator of the profitability of building a new house. It first presents the profitability indicator and discusses the difficulties in deriving a good gauge of profitability. It then looks at the correlation between the indicator and housing construction, and assesses if there is a long-run equilibrium relationship between these two variables.

Empirical q ratios for housing: Measurement issues and cross-country differences

52. There are several difficulties in deriving empirical *q* ratios for housing (*i.e.* the ratio between house prices and construction costs). For the numerator, it is important to have a measure of house prices that correct for changes in quality over time. For example, there is a major difference in the evolution of median sales prices of new houses in the United States and the price of constant-quality houses. Indeed, the *q* indicator for the United States would have a strong upward trend if the median sales price were used in the numerator. While such a correction can be made for the United States, this is not the case for all countries where house price data are available. For production costs, the implicit price deflator for private residential investment can serve as a good proxy for costs related to construction. It is closely correlated with construction price indices for the countries for which such data are available. However, construction cost indices may differ depending on whether they are based on fixed weights or weight adjusted for quality changes.

53. Perhaps the most serious problem in constructing q-ratios for housing relates to the difficulty of accounting for the cost of sites or land in the overall production cost of housing.[17] With a few exceptions (Japan, Germany, Denmark, Ireland and Sweden), information on residential land prices is not generally available. However, available information suggests that site costs are a sizeable part of the overall cost of property development, accounting for 20 to 40 per cent of the total.[18] Moreover, the price of land for residential construction has evolved differently from that of other costs. The price of land has risen at a faster pace than construction costs since the early 1970s in both Japan and Germany, and has also fluctuated much more. Indeed, land prices fluctuate like other asset prices, and appear to play a crucial role in determining the profitability of constructors.[19] Against this background, the lack of data on land prices is particularly disappointing.

54. Bearing in mind all these caveats, Figure 5 shows the ratio of house prices[20] to the implicit price deflator for private residential construction for 15 OECD countries over the 1970-99 period. The *q* indicator is indexed on 1991 being 100, and thus provides no information about the absolute level of price-cost misalignments. However, deviations from the average level of the *q* indicator over the whole period may serve as a measure of the degree of misalignment. The average extent of misalignment between house prices and construction costs differ significantly across countries. It is possible to divide the 16 countries

17. The importance of residential land prices is emphasised in T. Okumura (1997).

18. In Sweden, site costs for collectively built one- or two-dwelling buildings accounted for 15 per cent of total production costs in 1998. See Statistiska Centralbyran (1999). In the United States, data from a single nation-wide developer for the period 1988-91 puts the site cost as ranging from 24 to 42 per cent of total costs depending on the city, see Sommerville (1996).

19. See Sommerville (1996).

20. The data on house prices for the United States refer to constant quality housing. For Japan, house prices refer to the implicit price deflator for the housing stock as reported in national accounts. For other countries, house price data from the Bank for International Settlements have been used.

for which data are available into three groups depending on the average price-cost discrepancy, measured as the standard deviation of the *q* ratio over the 1985-1999 period (to reduce the impact of deterministic trends) (Table 10):

- Small misalignment is recorded in the three biggest economies in the OECD area. House prices never seem to get far out of line with construction costs in the United States, and the average discrepancy is small in Japan and Germany.

- Medium-sized misalignments are observed in France, United Kingdom and Canada, and also in Australia and Sweden.

- Large misalignments seem to characterise most of the smaller OECD countries. The standard discrepancy between house prices and construction costs is particularly large in the Netherlands, Belgium and Denmark.

This broad-brush picture continues to hold when looking at the period as a whole.

(Figure 5. Price-cost ratios in selected OECD countries)

(Table 10. Private residential investment price-cost ratio, standard deviation)

55. An unwanted feature of some of the *q* series is that they are not stationary as would be required for long-term equilibrium relationships between prices and costs. Indeed, formal unit root tests suggest that non-stationarity can only be rejected in seven out of the 16 cases (Table 11). This may be an indication of data problems, notably the failure to account for site costs. Although house prices and costs measured as the implicit residential investment deflator do not co-integrate, national studies have been able to uncover long-run price-cost relationships with better data. For example, house prices in Ireland are found to co-integrate with a national construction price index (which includes land) and nominal interest rates.[21]

(Table 11. Price-cost ratio and private residential investment: unit root test statistics)

Residential investment and empirical q ratios for housing

56. The evolution of the *q* indicator and the level of private residential investment over the 1970-99 period in the 16 countries under review is depicted in Figure 5 and the associated correlation coefficients are reported in Table 12. For the majority of the countries, there is a fairly close contemporaneous association between movements in the price/cost ratio and private residential investment. Over the 1980-99 period, the correlation coefficient is above 0.5 for ten of the 16 countries, with a strikingly high correlation for the Netherlands, Denmark, Belgium and Spain. On the other hand, there appear to be only weak links between the *q* indicator and residential investment in the United States, Japan and France, while the negative correlation observed for Germany is attributable to the impact of the reunification (including increased subsidies) on private residential construction.

(Table 12. Residential investment and its profitability)

57. Despite the strong correlation in the majority of the countries, statistical tests strongly reject the hypothesis that private residential investment and empirical *q* ratios form a long-run equilibrium relationship. With only a few exceptions, the two variables fail to form a long-run relationship, and this

21. See Kenny (1998).

result holds for the full sample and a truncated sample period (Table 13). These results do not necessarily imply that empirical *q* ratios play no role in influencing private residential investment in the long run. However, they strongly suggest that additional factors are important in determining construction activity.

(Table 13. Price-cost ratio and private residential investment: co-integration tests)

58. The failure of the *q* indicator alone to explain private residential investment in some of the countries under review could, to some extent, reflect that private residential construction, as recorded in national accounts, includes capital spending by semi-public institutions that is not likely to be responsive to profit opportunities. For example, in Sweden the share of semi-public houses and housing co-operatives in total completion of dwellings has ranged from 25 to 60 per cent in the 1975-98 period, and the decisions of these non-profit-oriented institutions are likely to have played a major role in the development of private construction. However, the *q* indicator is no more successful in explaining completion of private dwellings in Sweden than it is in accounting for private residential investment as recorded in national accounts. Similarly, the price/cost ratio in France cannot explain private construction activity even when it has been purged of the sizeable investment activity by the semi-public social housing agency (HLM).

VI. Policy implications

59. The link between house price developments and movements in aggregate demand suggests that economic policymakers can benefit from monitoring developments in property markets. In a number of OECD countries house prices are already regarded as important indicators of the state of the economy, and timely and comprehensive data on property prices are available. However, in some other countries, adequate information about real estate prices is lacking. Increased efforts would therefore be warranted to develop better data collection systems in this area.

60. Policymakers need to monitor changes in mortgage arrangements that make it easier for households to withdraw housing equity and hence to finance consumption. In the coming years, in particular in the European Union with the establishment of a single market in financial services, terms and conditions on mortgage products are likely to converge. Market forces could help to ensure that they will adjust to make mortgage borrowing easier in the countries where down-payment requirements are still high and repayment periods remain short. This process of convergence may thus involve a stimulus to demand by making it easier to withdraw housing equity.

61. Where strong increases in property values are part of a more general pattern of excess demand in markets for goods and services, the need for a monetary policy response is clear. The more difficult situation arises when no such general pattern of excess demand is apparent. Rising property prices may give rise to concern that inflation pressures are latent, but in their absence a policy response is difficult to justify. The major risk in this circumstance is that property prices may rise to unsustainable levels, resulting in severe balance-sheet problems once a correction sets in, as occurred in a number of countries in the late 1980s and early 1990s. Strong supervision arrangements in the financial sector and high prudential standards provide the best means of guarding against this risk.

Table 1. **Correlation coefficients: growth of real house prices and output gaps**

	Australia	Belgium	Canada	Denmark	Finland	France	Germany	Ireland	Italy	Japan	Netherlands	Norway	Spain	Sweden	United Kingdom	United States
1970-1999																
Correlation coefficients	0.5825	0.3200	0.5570	0.3239	0.4911	0.2132	0.5742	0.3230	0.2008	0.2492	0.2925	0.4045	0.5419	0.6295	0.4990	0.3374
t-statistic	3.7919	1.7872	3.4848	1.7788	2.9296	1.1336	3.6442	1.7734	1.0652	1.3614	1.6186	2.2982	3.0247	4.2094	3.0468	1.8963
1970-1980																
Correlation coefficients		-0.3353	0.3367	0.1793	0.8790	-0.2275	0.7079		-0.3319	0.6057	-0.1991	-0.4727			0.6109	0.1439
t-statistic		-1.0679	1.0112	0.5154	5.2134	-0.6607	2.8346		-0.9952	2.2837	-0.6094	-1.5172			2.3151	0.4361
Number obs		*8*	*10*	*10*	*3*	*8*	*10*		*10*	*11*	*8*	*10*			*10*	*11*
1980-1990																
Correlation coefficients	0.8044	0.5138	0.6861	0.4590	0.2188	0.5675	0.7335	0.1831	0.8086	-0.1955	0.3357	0.7449	0.5947	0.8408	0.5118	0.2918
t-statistic	4.0624	1.7966	2.8294	1.5500	0.6728	2.0678	3.2376	0.5586	4.1225	-0.5979	1.0690	3.3491	2.2193	4.6592	1.7873	0.9153
1990-1999																
Correlation coefficients	0.2818	0.5412	-0.4397	0.7396	0.2280	0.5521	0.7449	0.6752	0.7411	-0.0060	-0.4053	0.8553	0.6535	0.3656	0.1944	0.6285
t-statistic	0.8307	1.8203	-1.3848	3.1084	0.6622	1.8729	3.1578	2.5889	3.1218	-0.0170	-1.2540	4.6695	2.4420	1.1109	0.5606	2.2853

Source: Bank for International Settlements and OECD.

Table 2. **Household assets**

Per cent of household total assets

	Housing assets					Other assets in 1998		
	1970	1980	1990	1995	1998	Equity	Other financial assets	Other tangible assets
						Per cent		
United States	22	27	27	23	21	20	50	8
Japan	10	14	8	10	10	3	44	43
Germany	..	..	34	34	32	3	35	30
France[1]	34	44	43	42	40	3	47	9
Italy	36	40	37	35	31	17	39	13
United Kingdom	..	40	44	33	34	12	47	7
Canada	21	22	23	22	21	17	39	23

1. 1998 data refer to 1997.

Sources: OECD, *Financial Accounts of OECD countries*; United States, Federal Reserve, *Flow of Funds Accounts of the United States*, September 2000; Japan, Economic Planning Agency, *Annual Report on National Accounts, 2000*; Germany, Deutsche Bundesbank, *Ergebnisse der gesamtwirtschaftlichen Finanzierungsrechnung der Deutschen Bundesbank*; France, INSEE, *25 ans de Comptes de Patrimoine* (1969-1993), and *Rapport sur les Comptes de la Nation.* (France's estimates for household equity holdings have been corrected to exclude non-quoted shares. Data presented are based on national authorities' estimates of the ratio of quoted to non-quoted shares in household portfolios); Italy, Banca d'Italia, *Supplementi al Bollettino Statistico* and unpublished estimates (the data on equity holdings in Italy include both quoted and unquoted shares); United Kingdom, Central Statistical Office, *United Kingdom National Accounts*, *Financial Statistics*; Canada, Statistics Canada, *National Balance Sheet Accounts*.

Table 3. **Selected financial deregulation and liberalisation measures affecting the housing market**

United States	Securitisation introduced in 1971 Interest rate deregulation, phasing out of Regulation Q[1] over four years starting in 1980 Elimination of portfolio restrictions for thrifts in 1980
Japan	Bank specialisation requirements reduced in 1993 Interest rate deregulation completed in 1994
Germany	Interest rate deregulation in 1967 Implementation of Second Banking Directive (89/646/EEC)[2] into national law in 1992
France	Bank specialisation requirements reduced in 1984 Elimination of credit controls in 1987 Securitisation introduced in 1991 Implementation of Second Banking Directive (89/646/EEC) into national law in 1992
Italy	Interest rate deregulation in 1983 Credit ceilings eliminated in 1983 and temporarily re-imposed in 1986-87 Implementation of Second Banking Directive (89/646/EEC) into national law in 1993 Separation of long-term and short-term credit institutions abolished in 1994
United Kingdom	Credit controls, "the corset", eliminated in 1980 Bank of England's minimum lending rate abolished in 1981 Banks allowed to compete with building societies for housing finance after 1981 Building societies allowed to expand their lending business after 1986 Government withdrew guidelines on mortgage lending in 1986 Securitisation introduced in 1987 Implementation of Second Banking Directive (89/646/EEC) into national law in 1993
Canada	Ceiling on interest rates on bank loans eliminated in 1967 Restrictions on the banks' involvement in mortgage financing abolished in 1967 Banks allowed to have mortgage loan subsidiaries in 1980 Securitisation introduced in 1987
Australia	Bank specialisation requirements eliminated for large domestic banks in 1980 Quantitative bank lending guidance eliminated in 1982 Interest rate deregulation in 1985
Denmark	Liberalisation of mortgage contract terms in 1982 Interest rate deregulation in 1982 Elimination of restrictions on mortgage bond issuance in 1989 Implementation of Second Banking Directive (89/646/EEC) into national law in 1991
Finland	Funding quotas from the Central Bank to commercial banks eliminated in 1984 Interest rate deregulation in 1986 Government withdrew guidelines on mortgage lending in 1987 Securitisation introduced in 1989
Netherlands	Interest rate deregulation in 1980 Implementation of Second Banking Directive (89/646/EEC) into national law in 1992
New Zealand	Credit-allocation guidelines removed in 1984 Interest rate deregulation completed in 1984
Norway	Lending controls abolished in 1984 Interest rate deregulation in 1985
Sweden	Interest rate deregulation in 1985 Lending ceilings for banks abolished in 1985

1. Deposit interest rate ceilings.
2. This Directive refers to the co-ordination of laws, regulations and administrative provisions relating to the taking up and pursuit of activities and services of credit institutions. It is aimed at further liberalising banking services from the point of view of both the freedom of establishment and the freedom to provide financial services.

Source: Williamson and Mahar (1998), Freedman (1998), Booth *et al.* (1994), Drees and Pazarbasioglu (1995), and OECD.

Table 4. **Mortgage markets in OECD countries: Institutional set-up[1]**

	Main lenders[2] (approximate market share)	Interest adjustment (approximate market share)	Typical term (years)	Maximum loan-to-value ratio[3] (per cent)
United States		Fixed rate: 74% Initial fixed-period rate: 26%	30	75-80[4]
New mortgages:	Mortgage companies: 58% Commercial banks: 24% Savings Institutions: 15%			
Outstanding mortgages:	Mortgage pools: 55% Commercial banks: 19% Savings institutions: 12%			
Japan	Housing loan corporation: 30% Commercial banks: 64%	Fixed rate: 36% Initial fixed-period rate and variable rates: 64%	25-30	70-80[4]
Germany	Mortgage banks: 28% Savings banks: 26% Co-operative and Mutual credit banks: 14%	Initial fixed-period rate: 100%	25-30	60-80
France	Co-operative and Mutual credit banks: 34% Commercial banks: 33% Savings banks: 13%	Fixed rate: 60% Variable rate: 40%	15	80
Italy	Commercial Banks: 100%	Initial fixed-period rate: 50% Fixed rate: 50%	15	50
United Kingdom	Building societies:[5] 23% Commercial banks: 71%	Initial fixed-period rate: 95% Variable rate: 5%	25	100
Canada	Commercial banks: 55% Trust companies: 11% Co-operative credit institutions: 14%	Fixed or initial fixed-period rate: 92% Variable rate: 8%	25	75 [4]
Austria	Savings banks: 26% Bausparkassen: 20% Mortgage banks: 19%	Initial fixed-period rate: 100%	20-30	60-80
Belgium	Commercial banks: 91% Insurance corporations and Pension funds: 6%	Initial fixed-period rate: 79% Fixed rate: 21%	20	80-85

Table 4. **Mortgage markets in OECD countries: Institutional set-up[1]** (continued)

	Main lenders[2] (approximate market share)	Interest adjustment (approximate market share)	Typical term (years)	Maximum loan-to-value ratio[3] (per cent)
Denmark	Mortgage banks: 90% Commercial banks: 10%	Fixed rate: 78%	30	80
Finland	Commercial banks: 38% Specialised lenders: 38% Co-operative and Mutual credit banks: 19%	Initial fixed-period rate: 90%	15-18	70-80
Greece	Commercial banks: 67% Specialised institutions: 31%	Initial fixed-period rate: 88% Fixed rate: 12%	15	70
Ireland	Building societies: 62% Commercial banks: 38%	Initial fixed-period rate: 70% Variable rate: 30%	20	90
Netherlands	Commercial banks: 85% Insurance corporations and Pension funds: 15%	Initial fixed-period rate: 80% Variable rate: 20%	30	75
Norway	Savings banks: 43% Commercial banks: 38%	Initial fixed-period rate: 10% Variable rate: 90%	15-20	80
Portugal	Commercial banks: 100%	Variable rate: 100%	15	90
Spain	Savings banks: 52% Commercial banks: 38%	Initial fixed-period rate: 50% Variable rate: 50%	15	80
Sweden	Mortgage banks: 80% Insurance corporations and Pension funds: 10% Commercial banks: 10%	Initial fixed-period rate: 100%	<30	60-80

Note: In a fixed rates contract the interest rate does not change throughout the entire duration of the loan. An initial fixed-period rate contract will start with a period during which the interest rate does not change. After this initial period, the interest rate can either be fixed for another period or vary. In a variable rate contract the interest rate could change from every day up to one year.

1. Most recent data available.
2. Market shares of main lenders in the United States refer to new mortgage, representing the flow of new loans, and to outstanding mortgages defined as the stock of loans (including securitisation). For Canada and European countries, securitised mortgage loans are included.
3. Normal maximum loan-to-value ratios are presented here. The European Mortgage Federation also reports absolute maximum loan-to-value ratios.
4. For these countries, typical loan-to-value ratio are presented.
5. Since 1997 a number of building societies have converted their status of mutual institutions to commercial banks. The share of building societies indicated above refers to the remaining institutions under the Building Society Act.

Source: European Mortgage Federation (2000), Noguchi and Poterba (1994), US Department of Housing and Urban Development, Canadian Housing and Mortgage Corporation.

Table 5. **Private consumption and net wealth: regression results**

Panel A. Long-term relationships

	United States	Canada	United Kingdom	France
Net wealth	0.22	0.25	0.12	0.14
	(13.1)	(9.5)	(4.3)	(2.4)
MPC	4.00	5.18	1.90	2.62
Short-term interest rate	-0.003			
	(-4.9)			
Long-term interest rate		-0.011		0.003
		(-11.2)		(2.1)
Constant	-0.45	-0.39	-0.26	-0.37
	(-16.3)	(-8.9)	(-5.2)	(-4.0)
Time period	70:1 - 99:2	73:1 - 98:2	79:1 - 99:2	70:1 - 98:2
R2	0.81	0.92	0.39	0.10
Dummies			1993	
Cointegration tests ADF residuals (2 lags)	1%	1%	10%	10%

Panel B. Short-term relationships

	United States	Canada	United Kingdom	France
ΔC/Y(-1)				
ΔTotal wealth	0.20	0.47		0.11
	(4.8)	(5.5)		(1.9)
ΔTotal wealth (-1)				
ΔTotal wealth (-2)			0.16	
			(3.0)	
ΔHousing equity withdrawal	0.004	0.004	0.007	
	(2.0)	(2.1)	(3.2)	
ΔHousing equity withdrawal (-1)				0.006
				(2.2)
ΔHousing equity withdrawal (-2)			0.008	
			(3.3)	
ΔUnemployment rate	-0.003			
	(-1.8)			
ΔInflation rate		-0.004		
		(-2.5)		
ΔInterest rate				0.004
				(3.1)
ECT[-1]	**-0.38**	**-0.31**	**-0.27**	**-0.10**
	(-4.2)	**(-2.5)**	**(-3.4)**	**(-1.8)**
Dummies				
R2	0.42	0.65	0.48	0.34
SE	0.01	0.01	0.01	0.01
DW	1.52	1.56	1.77	2.18
Chow forecast test	0.40	0.52	0.37	0.28
Reset test	0.82	0.41	0.09	0.43
Serial correlation	0.17	0.11	0.90	0.42
Normality	0.58	0.41	0.02	0.58
Chow breakpoint test	0.58	0.04	0.01	0.54

Table 6. **Private consumption and different components of wealth: regression results**

Panel A. Long-term relationships

	United States	Canada	United Kingdom	France	Italy	Japan
Financial wealth	0.14	0.23	0.13	0.16	0.13	0.19
	(12.4)	(18.5)	(3.2)	(6.3)	(20.3)	(20.7)
MPC	0.04	0.083	0.037	0.079	0.05	0.069
Housing wealth	0.02	0.11	0.06	0.08	-0.06	0.07
	(1.3)	(3.4)	(2.2)	(3.3)	(-4.4)	(7.0)
MPC	0.02	0.18	0.027	0.037	-0.03	0.163
Other wealth			0.16	0.11		
			(3.5)	(5.4)		
MPC			0.225	0.121		
Interest rate	-0.002	-0.009		0.008		
	(-3.2)	(-8.8)		(7.6)		
Constant	-0.27	-0.19	-0.18	-0.30	-0.31	-0.23
	(-19.3)	(-12.1)	(-8.6)	(-15.1)	(-59.0)	(-47.4)
Time period	70:1 - 99:2	73:1 - 98:2	82:1 - 99:2	70:1 - 97:2	80:1 - 96:2	75:1 - 98:2
R2	0.81	0.92	0.83	0.76	0.94	0.96
Dummies		1982 / 1993		1978 / 1987	1982	1989
Cointegration tests						
ADF residuals (2 lags)	1%	1%	10%	1%	10% (1 lag)	1%

Panel B. Short-term relationships

	United States	Canada	United Kingdom	France	Italy	Japan
ΔC/Y(-1)		0.24	0.46			
		(2.1)	(3.0)			
ΔFinancial wealth	0.13		0.10	0.18	0.10	0.19
	(4.7)		(2.5)	(7.2)	(4.6)	(20.7)
ΔFinancial wealth (-1)		0.19	-0.14			
		(2.3)	(-3.3)			
ΔFinancial wealth (-2)			0.10	0.05		0.13
			(2.2)	(2.1)		(3.6)
ΔHousing wealth			0.15	0.11	-0.06	0.07
			(4.8)	(1.8)	(-4.4)	(7.0)
ΔHousing wealth (-1)	-0.06					
	(-1.8)					
ΔHousing wealth (-2)					-0.10	
					(-4.9)	
ΔOther wealth	0.23	0.55	0.16	0.12		0.08
	(3.4)	(8.9)	(3.9)	(6.2)		(2.0)
ΔOther wealth (-1)		-0.51	0.08		0.14	-0.07
		(-7.0)	(1.9)		(7.1)	(-1.9)
ΔOther wealth (-2)					0.04	
					(5.1)	
Δ^2 Unemployment rate	-0.01					
	(-3.6)					
ECT[-1]	**-0.23**	**-0.44**	**-0.37**	**-0.34**	**-0.23**	**-0.60**
	(-2.6)	**(-4.2)**	**(-3.1)**	**(-2.8)**	**(-2.0)**	**(-4.6)**
Dummies		1993	1989	1978	1983 / 1993	1989
R2	0.60	0.72	0.73	0.46	0.86	0.57
SE	0.01	0.01	0.01	0.01	0.00	0.01
DW	1.63	1.81	1.80	1.92	1.76	1.90
Chow forecast test	0.24	0.47	0.20	0.31	0.41	0.36
Reset test	0.73	0.28	0.36	0.36	0.22	0.44
Serial correlation	0.15	0.55	0.21	0.71	0.74	0.89
Normality	0.58	0.23	0.86	0.31	0.31	0.49
Chow breakpoint test	0.72	0.11	0.00	0.63	0.23	0.24

Table 7. **Private consumption and gross housing wealth: regression results**

Panel A. Long-term relationships

	United States	Canada	United Kingdom	Italy	Japan
Gross housing wealth	0.08	0.16	0.18	-0.03	0.17
	(5.1)	(3.1)	(8.6)	(-2.0)	(6.2)
MPC	0.048	0.12	0.06	-0.02	0.18
Financial wealth - mortgages	0.12	0.08		0.13	0.11
	(11.1)	(2.9)		(15.7)	(15.7)
MPC	0.03	0.03		0.05	0.04
Short-term interest rate	-0.003				0.001
	(-4.7)				(1.8)
Long-term interest rate		-0.010			
		(-7.4)			
Inflation rate		-0.009			-0.003
		(-3.7)			(-1.7)
Constant	-0.24	-0.10		-0.31	-0.18
	(-20.3)	(-5.1)		(-44.1)	(-16.6)
Time period	70:1 - 99:2	73:1 - 98:2	84:1 - 99:2	80:1 - 96:2	75:1 - 98:2
R2	0.82	0.91		0.90	0.96
Cointegration tests ADF residuals (2 lags)	5%	1%		5% (1 lag)	5%

Panel B. Short-term relationships

	United States	Canada		Italy	Japan
ΔC/Y(-1)				0.25	
				(1.7)	
ΔGross housing wealth		0.48			0.17
		(6.0)			(3.1)
ΔGross housing wealth (-1)					
Δ^2 Gross housing wealth	0.12				
	(2.2)				
ΔFinancial wealth - mortgages	0.08			0.09	
	(2.9)			(2.1)	
ΔFinancial wealth - mortgages (-1)					
ΔFinancial wealth - mortgages (-2)					0.08
					(2.7)
Δ^2 Unemployment rate	-0.005				
	(-3.5)				
ΔInflation rate		-0.007			
		(-3.3)			
ΔInflation rate (-1)					
ΔInflation rate (-2)				-0.004	
				(-2.0)	
ΔInterest rate	-0.003	-0.003			
	(-2.8)	(-2.3)			
ECT[-1]	**-0.18**	**-0.30**		**-0.40**	**-0.58**
	(-1.8)	**(-3.0)**		**(-2.7)**	**(-4.2)**
R2	0.50	0.71		0.37	0.57
SE	0.01	0.01		0.01	0.01
DW	1.54	1.60		1.60	1.85
Chow forecast test	0.44	0.23		0.11	0.35
Reset test	0.38	0.096		0.43	0.76
Serial correlation	0.31	0.015		0.34	0.83
Normality	0.67	0.61		0.31	0.30
Chow breakpoint test	0.56	0.03		0.11	0.04

Table 8. **Private consumption, wealth and housing equity withdrawal: regression results**

Panel A. Long-term relationships

	United States	Canada	United Kingdom	France
Financial wealth	0.13	0.24	0.17	0.07
	(13.4)	(17.4)	(8.2)	(2.2)
MPC	0.03	0.09	0.05	0.03
Housing wealth		0.12		0.08
		(3.3)		(1.7)
MPC		0.20		0.04
Other wealth			0.17	0.08
			(5.4)	(3.4)
MPC			0.03	0.09
Housing equity withdrawal	0.005	0.004	0.005	0.015
	(4.1)	(2.1)	(3.0)	(5.6)
MPC (1998-1999)	0.5524		0.4200	
Interest rate	-0.002	-0.008		0.006
	(-3.4)	(-6.3)		(4.6)
Constant	-0.25	-0.19	-0.20	-0.16
	(-19.8)	(-10.4)	(-14.2)	(-4.0)
Time period	70:1 - 99:2	73:1 - 98:2	82:1 - 99:2	73:1 - 97:1
R2	0.85	0.89	0.91	0.69
Dummies			1993	1978 / 1987
Cointegration tests ADF residuals (2 lags)	1%	1%	1%	10%

Panel B. Short-term relationships

	United States	Canada	United Kingdom	France
ΔC/Y(-1)			0.50	
			(3.7)	
ΔFinancial wealth	0.12			0.04
	(4.6)			(2.1)
ΔFinancial wealth (-1)				
ΔFinancial wealth (-2)				0.07
				(3.1)
ΔHousing wealth		0.34		0.19
		(4.1)		(3.9)
ΔHousing wealth (-1)	-0.07	-0.30		
	(-2.2)	(-3.9)		
ΔHousing wealth (-2)				
ΔOther wealth	0.21	0.15		0.13
	(3.2)	(2.2)		(4.2)
ΔOther wealth (-1)				
ΔHousing equity withdrawal	0.004	0.008	0.004	0.009
	(2.5)	(4.2)	(2.0)	(4.0)
ΔUnemployment rate		-0.005		
		(-2.4)		
Δ^2 Unemployment rate	-0.005			
	(-3.6)			
ECT[-1]	**-0.29**	**-0.45**	**-0.54**	**-0.21**
	(-3.1)	**(-4.6)**	**(-3.0)**	**(-2.7)**
Dummies			1989	1978
R2	0.58	0.69	0.53	0.64
SE	0.01	0.01	0.01	0.01
DW	1.50	1.43	1.83	2.26
Chow forecast test	0.79	0.20	0.12	0.51
Reset test	0.89	0.10	0.77	0.94
Serial correlation	0.23	0.05	0.98	0.42
Normality	0.27	0.68	0.85	0.89
Chow breakpoint test	0.60	0.56	0.04	0.68

Table 9. **Private consumption: short-term relationship with net wealth and housing equity withdrawal**

	United States	Canada	United Kingdom	France
ΔC/Y(-1)				
ΔTotal wealth	0.20	0.47	0.12	0.11
	(4.8)	(5.5)	(3.0)	(1.9)
ΔTotal wealth (-1)				
ΔTotal wealth (-2)			0.16	
			(3.0)	
ΔHousing equity withdrawal	0.004	0.004	0.007	
	(2.0)	(2.1)	(3.2)	
ΔHousing equity withdrawal (-1)			0.004	0.006
			(1.8)	(2.2)
ΔHousing equity withdrawal (-2)			0.008	
			(3.3)	
ΔUnemployment rate	-0.003			
	(-1.8)			
ΔInflation rate		-0.004		
		(-2.5)		
ΔInterest rate				0.004
				(3.1)
ECT[-1]	**-0.38**	**-0.31**	**-0.27**	**-0.10**
	(-4.2)	**(-2.5)**	**(-3.4)**	**(-1.8)**
Dummies				
R2	0.42	0.65	0.48	0.34
SE	0.01	0.01	0.01	0.01
DW	1.52	1.56	1.77	2.18
Chow forecast test	0.40	0.52	0.37	0.28
Reset test	0.82	0.41	0.09	0.43
Serial correlation	0.17	0.11	0.90	0.42
Normality	0.58	0.41	0.02	0.58
Chow breakpoint test	0.58	0.04	0.01	0.54

Table 10. **Private residential investment price-cost ratio,[1] standard deviation**

Index points

	1970-99	1970-84	1985-99
United States	2.0	2.7	0.6
Japan	4.3	5.6	1.6
Germany	12.8	11.1	3.1
France	5.9	5.6	6.2
Italy	10.8	9.6	12.1
United Kingdom	9.6	8.3	6.8
Canada	13.0	5.6	7.8
Australia	14.7	13.7	8.8
Belgium	15.3	11.1	18.0
Denmark	15.8	14.0	16.8
Finland	11.7	10.4	12.4
Ireland	9.1	8.0	10.0
Netherlands	24.5	25.7	23.7
Norway	20.3	11.4	12.0
Spain	21.2	7.4	15.9
Sweden	22.6	18.3	8.9

1. The price-cost ratio of private residential investment is measured as the ratio of residential property prices to the implicit residential investment deflator (which excludes land costs), with the ratio being indexed at 100 in 1991. Residential property prices in the United States refer to constant-quality price index, and in Japan it refers to the implicit price index for the residential housing stock as recorded in national accounts.

Source: OECD.

Table 11. **Price-cost ratio and private residential investment: unit root test statistics**

	Price-cost ratio	Residential investment
United States	-1.83	-1.68
Japan	-3.37	-2.29
Germany	-2.90	-0.63
France	-2.93	-3.64
Italy	-3.01	-3.22
United Kingdom	-3.10	-2.87
Canada	-1.38	-1.67
Australia	-2.16	-2.62
Belgium	-1.21	-1.80
Denmark	-2.91	-2.03
Finland	-2.90	-3.48
Ireland	-1.67	1.43
Netherlands	-2.06	-0.92
Norway	-1.53	-1.99
Spain	-0.90	-0.61
Sweden	-1.41	-2.02

Note: The test statistics refer to the Augmented Dickey Fuller (ADF) test. The price-cost ratio of private residential investment is measured as the ratio of residential property prices to the implicit residential investment deflator (which excludes land costs). Residential property prices in the United States refer to constant-quality price index, and in Japan it refers to the implicit price index for the residential housing stock as recorded in national accounts.

Source: OECD.

Table 12. **Residential investment and its profitability**[1]

	Correlation coefficients, 1980 to 1999 *(*: Statistically significant at 5 per cent level)*
United States	0.37
Japan	0.35
Germany	-0.71*
France	0.25
Italy	0.77*
United Kingdom	0.61*
Canada	0.66*
Australia	0.51*
Belgium	0.83*
Denmark	0.92*
Finland	0.59*
Ireland	0.43
Netherlands	0.92*
Norway	0.16
Spain	0.82*
Sweden	0.60*

Note: Residential property prices in the United States refer to constant-quality price index, and in Japan they refer to the implicit price deflator for the residential housing stock as recorded in national accounts.

1. Data for residential investment refer to the private sector. Its profitability is measured as the ratio of residential property prices to the implicit residential investment deflator (which excludes land costs).

Source: OECD.

Table 13. **Price-cost ratio and private residential investment: co-integration tests**

	1970-99	1980-99
United States	-2.82	-2.42
Japan	-2.67	-1.46
Germany	-2.45	-1.89
France	-3.74	-2.65
Italy	-3.47	-4.13
United Kingdom	-2.44	-2.11
Canada	-2.40	-1.61
Australia	-1.23	-1.37
Belgium	-2.25	-2.24
Denmark	-1.51	-2.44
Finland	-2.56	-2.00
Ireland	-1.62	0.43
Netherlands	-1.96	-2.03
Norway	-1.85	-1.52
Spain	-1.91	-1.03
Sweden	-1.72	-1.47

Note: The test statistics refer to ADF statistics for the residual from a regression of the log of private residential investment on the log of the price-cost ratio and a constant. The McKinnon critical values are in the interval -2.7 to -2.6.

Source: OECD.

Figure 1. **Real house price developments, 1970 - 1999**[1]

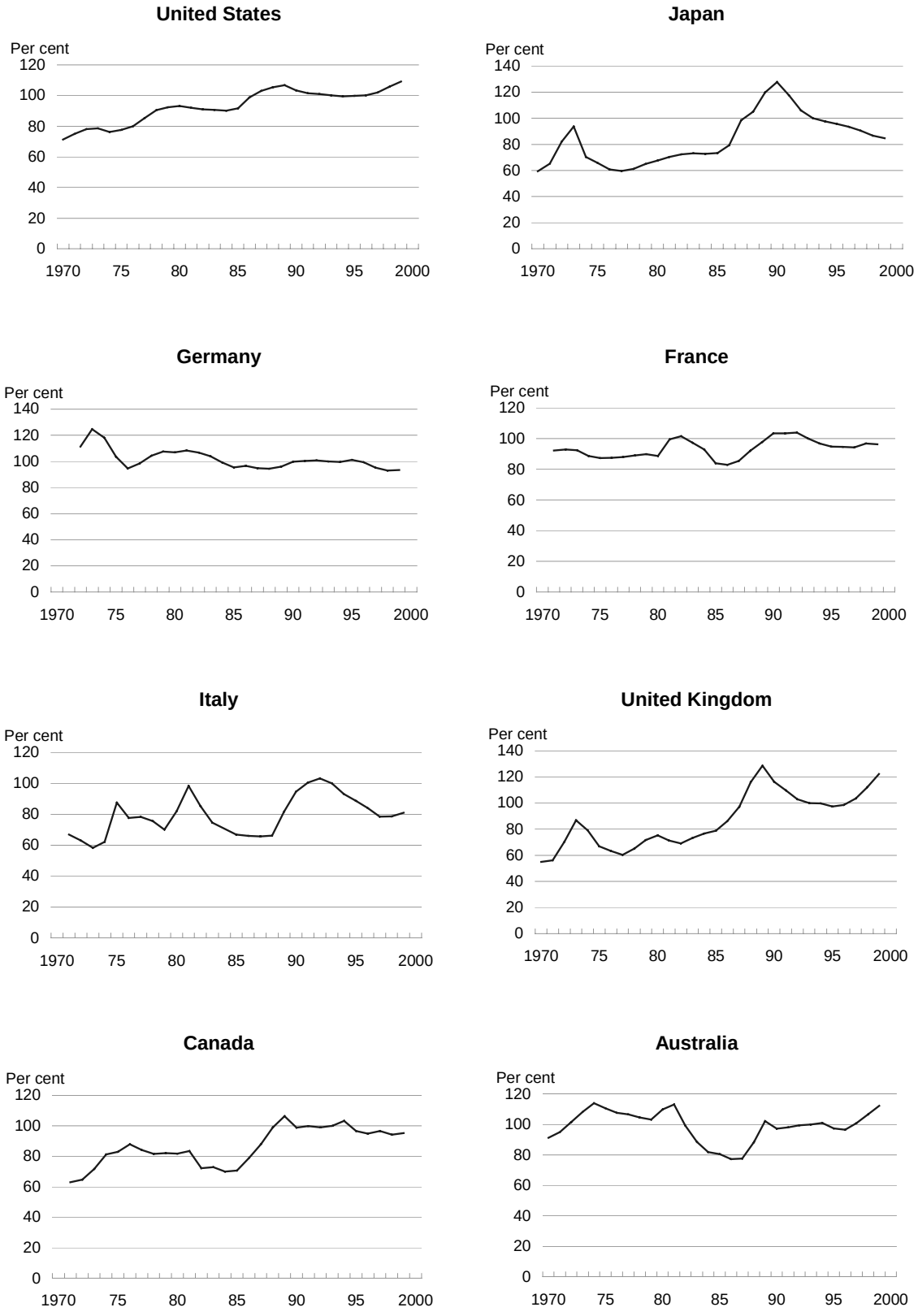
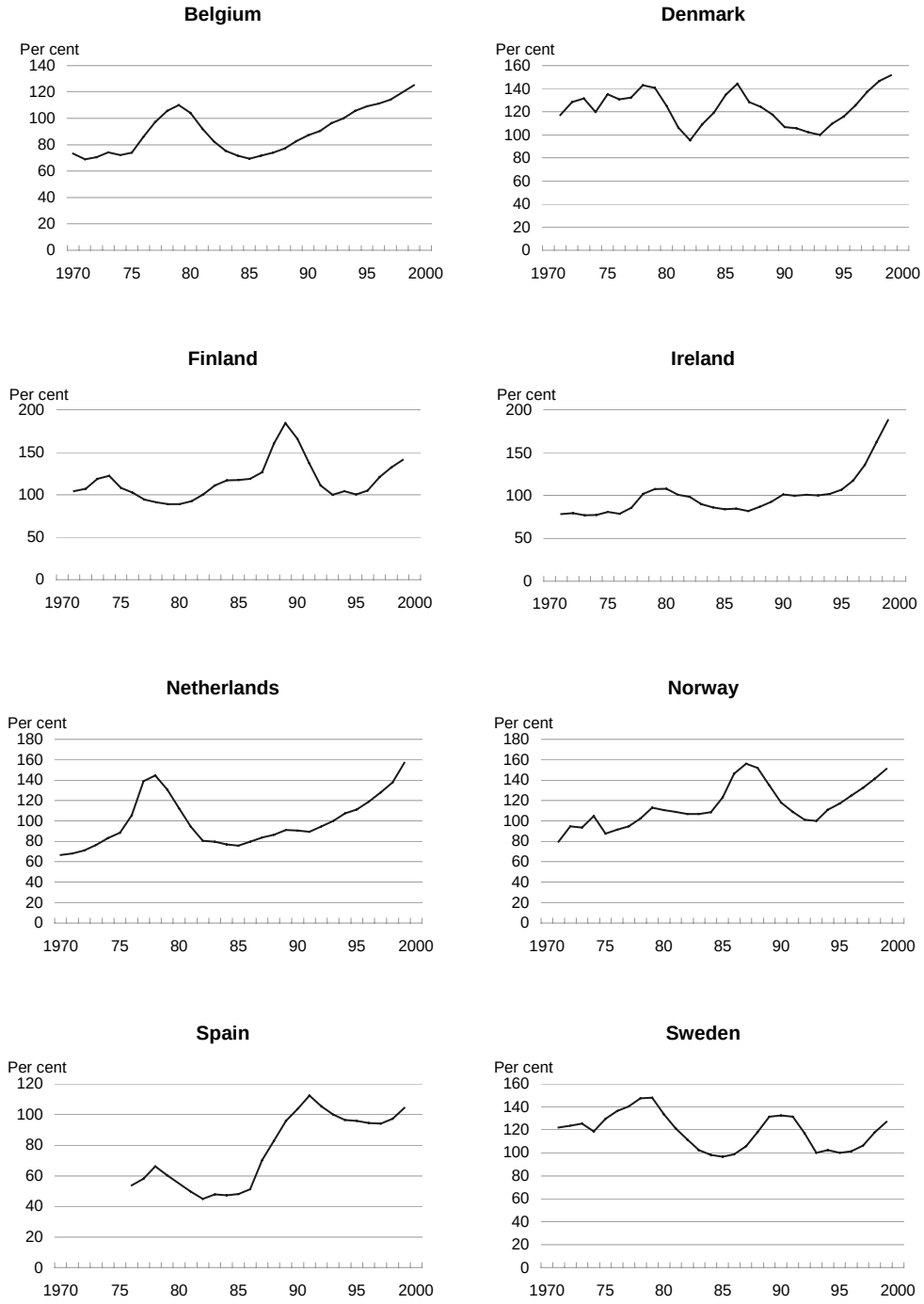


Figure 1 (continued). **Real house price developments, 1970 - 1999**[1]

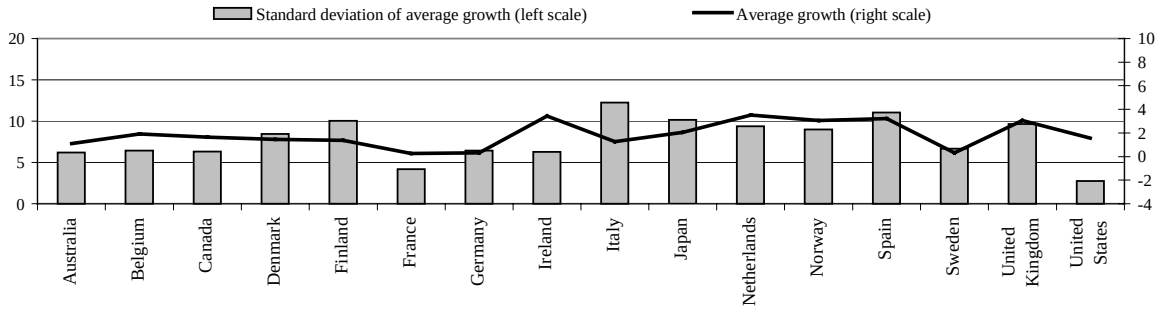


1. House prices are deflated by the consumer price index. Data on residential property prices are not strictly comparable across countries due to differences in definition. In most countries, the house price index covers house prices on a national basis. However, in Australia, the index refers to a weighted average of capital cities and regional areas, whereas in Germany, the index refers to the prices of houses located in western Germany. In Japan, the price index refers to residential land prices. Furthermore, depending on the country, the index relates to prices of existing and/or new houses, to prices of houses for owner-occupation only or also to prices of second residences, to prices of houses for which a loan has been applied for only or to a mix-adjusted house price index taking into account several differences in property type.

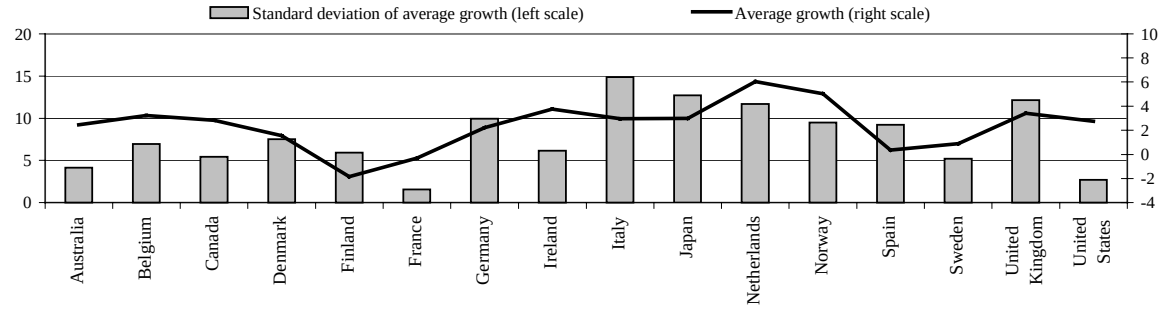
Source : Bank for International Settlements.

Figure 2. Volatility of growth in inflation-adjusted house prices

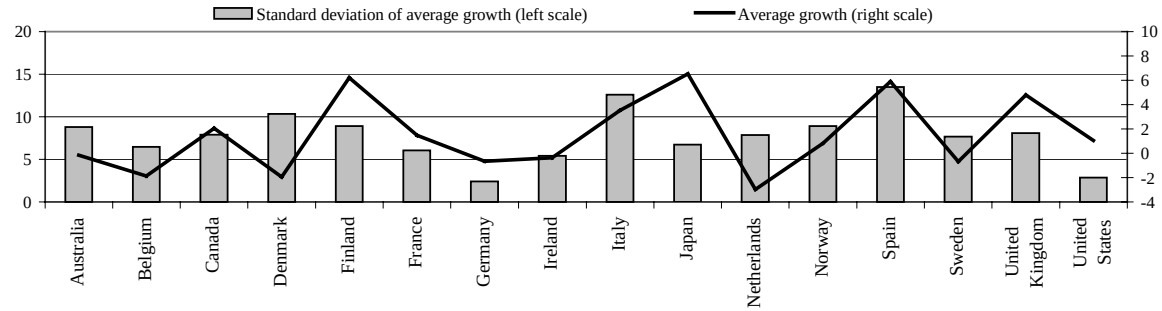
1970-1999



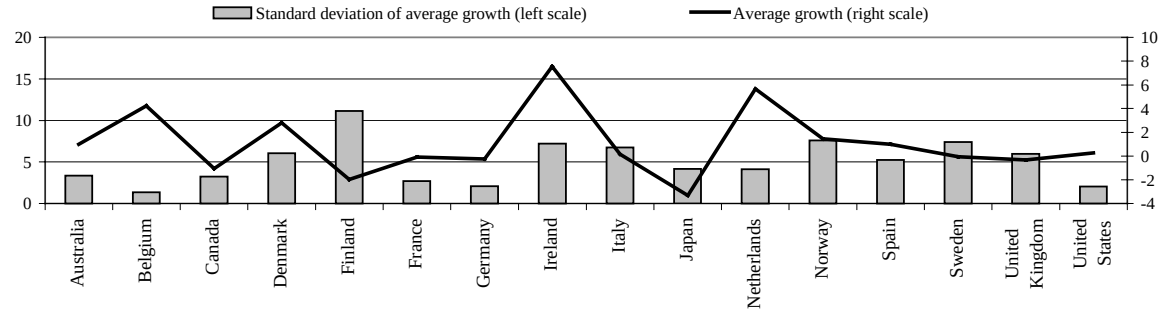
1970-1980



1980-1990



1990-1999



Note:
Averages over all countries:
Standard deviation of average growth: 7.83 (1970-1999), 7.85 (1970-1980), 7.78 (1980-1990), 5.02 (1990-1999)
Average growth: 1.84 (1970-1999), 2.39 (1970-1980), 1.48 (1980-1990), 1.06 (1990-1999)
Source: OECD.

Figure 3. New mortgages in selected countries [1]

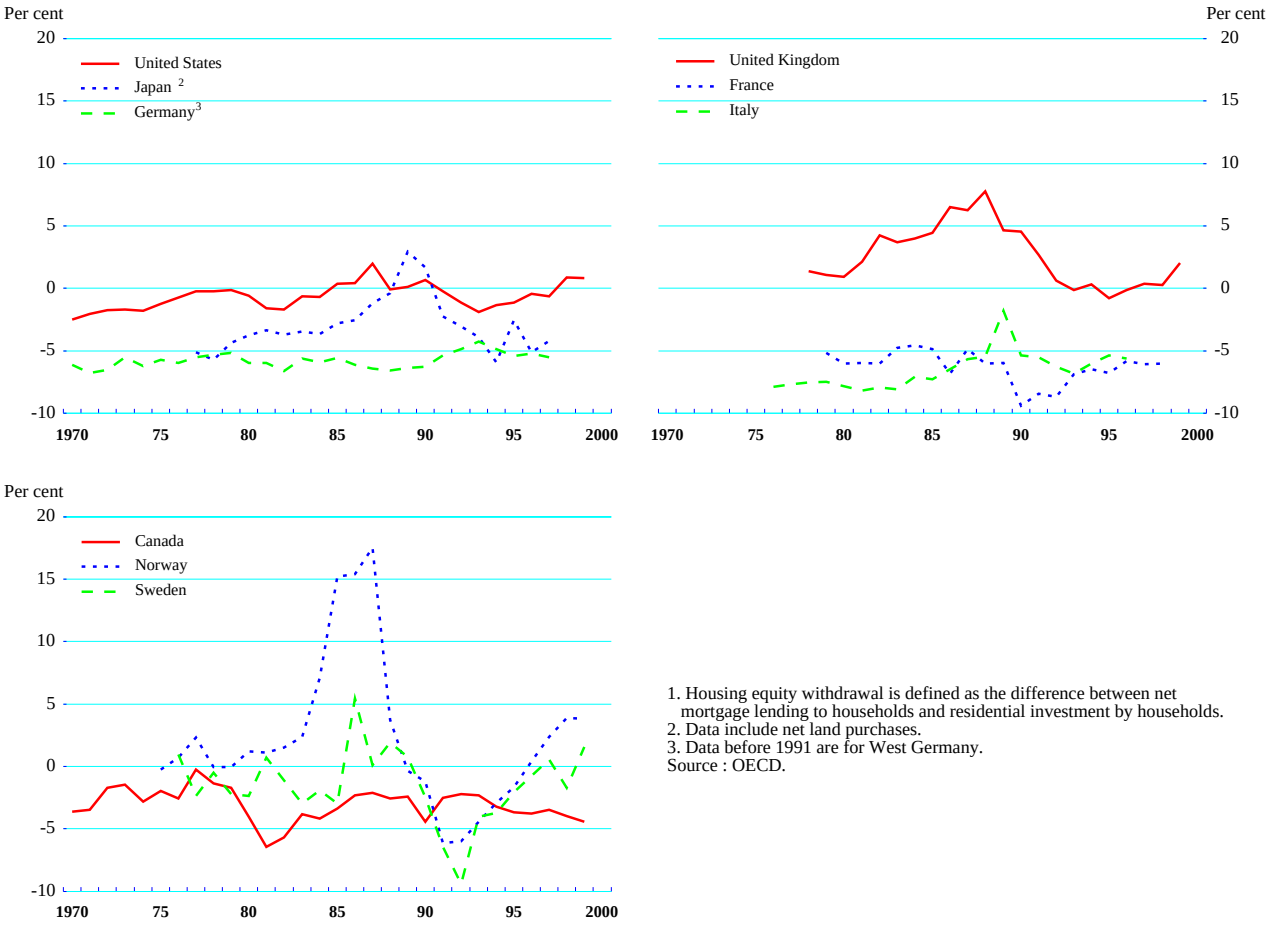
Per cent of GDP



1. Measured as the flow of new loans.
2. Data before 1991 are for West Germany.
Source: OECD.

Figure 4. Housing equity withdrawal in selected OECD countries [1]

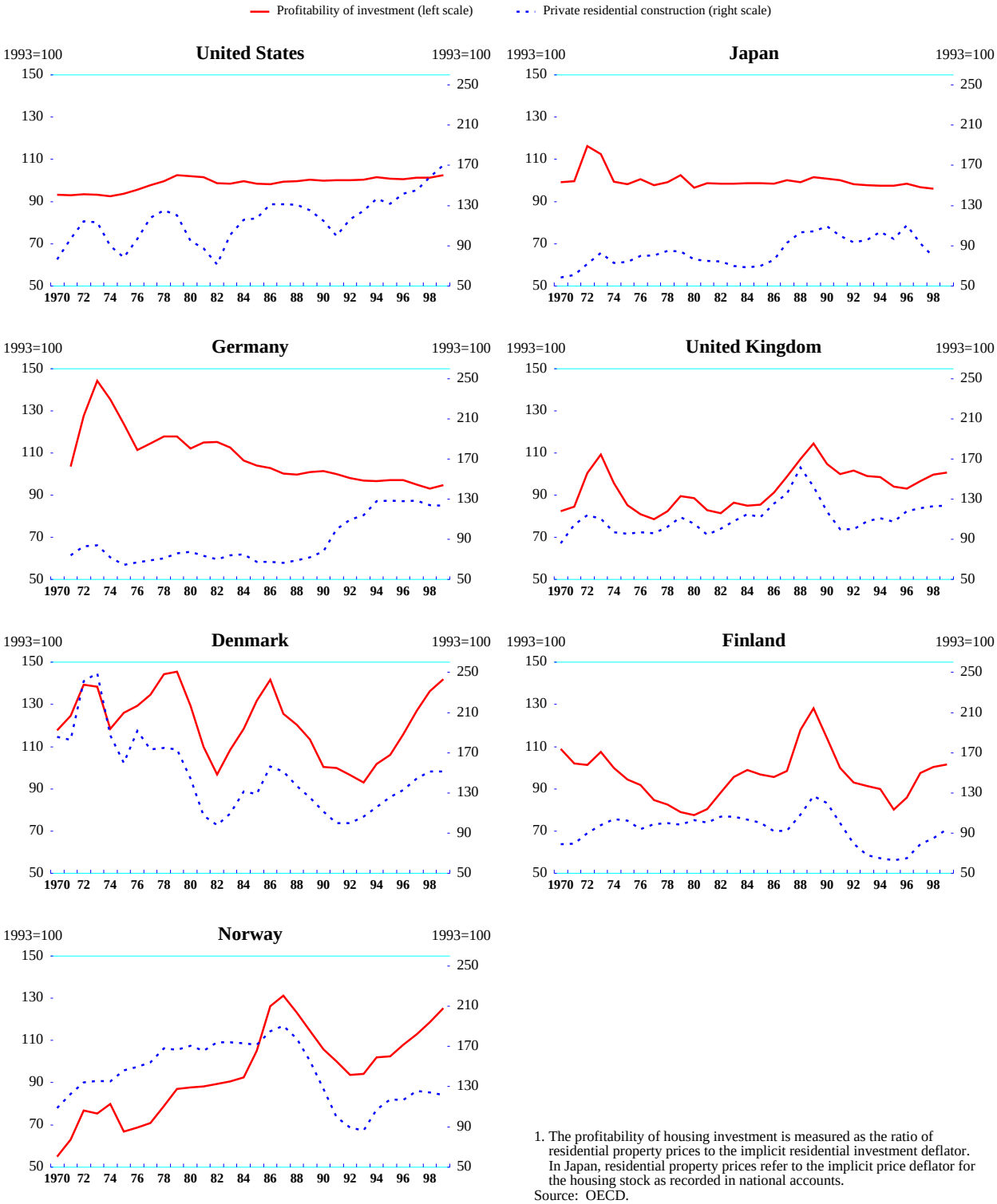
Per cent of household disposable income



1. Housing equity withdrawal is defined as the difference between net mortgage lending to households and residential investment by households.
2. Data include net land purchases.
3. Data before 1991 are for West Germany.

Source : OECD.

Figure 5. Price-cost ratios in selected OECD countries [1]



1. The profitability of housing investment is measured as the ratio of residential property prices to the implicit residential investment deflator. In Japan, residential property prices refer to the implicit price deflator for the housing stock as recorded in national accounts.

Source: OECD.

ANNEX

Stationarity and Johansen co-integration tests

1. For all countries, private consumption and total net worth contain a unit root in levels, but the ADF test rejects the null hypothesis of a unit root in first differences. With the exception of the United Kingdom, the three different components of net worth were generally found to be integrated of the first order. In the United Kingdom (where the sample is very short) test statistics cannot reject the null hypothesis that the different components are I(2).

(Table A1. Augmented Dickey-Fuller tests)

2. Tests were carried out on two potential co-integrating equations with the help of the Johansen technique for comparison with the results obtained with the Granger-Engle approach. The first equation included the log ratio of private consumption to household disposable income, the log ratio of net wealth to disposable income, inflation and interests rates (nominal or real). The second equation included the log ratio of private consumption to household disposable income; the log ratios of housing wealth, financial wealth and other wealth to disposable income; inflation and interest rates. With no *a priori* information available concerning the appropriate length of the test VAR, both equations were estimated with lags of 2, 4, 6 and 8 semesters. Only statistically significant co-integrating vectors including all key variables of the specification at 5 per cent and 1 per cent confidence levels are reported in Table A2. As can be seen from the table, statistically significant co-integrating vectors are found for most countries at some lag lengths. However, coefficient estimates often vary significantly depending on the lag length used for the VAR.

3. The estimated coefficients are in some cases similar to those estimated with the Granger-Engle strategy and reported in the main text. Thus, the estimated total wealth elasticity is identical for the United States; and the housing wealth elasticity is similar for Japan, the United Kingdom and, to a lesser extent, in the United States. In some other cases, the coefficients in the long-run relationship are above those estimated using the Granger-Engle techniques, and point to significantly stronger effects than reported in the literature. This is the case for the total wealth and housing wealth elasticities in France and Canada (but the high total wealth elasticity in France is not statistically significant). On the other hand, the low estimated total wealth elasticity for the United Kingdom is not statistically significant in the Johansen estimation. And for Italy, the Johansen procedure points to strong positive total and housing wealth effects on consumption, while the Granger-Engle estimates suggest that they are not significant or negative, respectively.

(Table A2. Johansen co-integration test)

Table A1. **Augmented Dickey-Fuller test**

	United States	Canada	United Kingdom	France	Italy	Japan
Consumption as % of Household Disposable Income						
Level	-0.32	-0.86	-2.69 *	-1.63	0.49	-0.97
1st difference	-6.19 ***	-4.27 ***	-4.45 ***	-5.34 ***	-5.03 ***	-4.57 ***
Financial wealth as % of Household Disposable Income						
Level	1.68	0.56	0.41	1.46	0.98	-0.83
1st difference	-3.37 **	-3.16 **	-2.61	-4.12 ***	-2.61 *	-3.81 ***
Housing wealth as % of Household Disposable Income						
Level	-1.15	-3.07 **	-1.67	-2.77 *	-1.63	-0.89
1st difference	-3.02 **	-3.07 **	-1.87	-3.59 ***	-2.14	-4.35 ***
Other wealth as % of Household Disposable Income						
Level	0.05	-2.16	-1.46	-0.69	-0.73	-1.86
1st difference	-3.43 **	-3.55 **	-2.43	-3.32 **	-3.38 **	-3.44 **
Total wealth as % of Household Disposable Income						
Level	0.71	-0.01	-0.63	1.46	-1.66	-1.84
1st difference	-3.74 ***	-3.88 ***	-3.15 **	-4.60 ***	-3.02 **	-3.64 ***

*** Stationarity at 1% level of significance (MacKinnon critical values)
** Stationarity at 5% level of significance
* Stationarity at 10% level of significance

Table A2. **Johansen co-integration tests**

United States

Lags	Constant	*cy*	*fe*	*he*	*nw*	*Irsr*
4	0.275	1.000	-0.151	-0.044		0.003
	(0.024)		(0.021)	(0.019)		(0.001)
6	0.287	1.000	-0.166	-0.063		0.003
	(0.020)		(0.018)	(0.016)		(0.001)
4	0.437	1.000			-0.212	0.002
	(0.035)				(0.021)	(0.001)
6	0.441	1.000			-0.215	0.003
	(0.024)				(0.015)	(0.000)
8	0.602	1.000			-0.314	0.001
	(0.056)				(0.034)	(0.001)

Canada

Lags	Constant	*cy*	*fe*	*he*	*nw*	*Irlr*	*Irl*
2	0.199	1.000	-0.195	-0.018		0.011	
	(0.047)		(0.029)	(0.103)		(0.003)	
4	0.115	1.000	-0.278	-0.300		0.009	
	(0.047)		(0.022)	(0.106)		(0.002)	
6	0.185	1.000	-0.219	-0.092		0.010	
	(0.025)		(0.011)	(0.057)		(0.001)	
4	0.571	1.000			-0.378		0.010
	(0.086)				(0.055)		(0.002)

United Kingdom

Lags	Constant	*cy*	*fe*	*he*	*ow*	*nw*
4	0.094	1.000	-0.055	-0.057	-0.099	
	(0.011)		(0.019)	(0.009)	(0.020)	
6	0.125	1.000				-0.022
	(0.121)					(0.071)

Note : The numbers in parentheses under the estimated coefficents are the standard errors.

cy = log (Private consumption / Disposable income)
fe = log (Financial wealth / Disposable income)
he = log (Housing wealth / Disposable income)
ow = log (Other wealth / Disposable income)
nw = log (Net wealth / Disposable income)

Irsr = Real short-term interest rate
Irlr = Real long-term interest rate
Irs = Nominal short-term interest rate
Irl = Nominal long-term interest rate
Inf = Inflation rate

Table A2. **Johansen co-integration tests** (continued)

France

Lags	Constant	*cy*	*fe*	*he*	*ow*	*Irlr*	*nw*	*Irl*
2	0.422	1.000	-0.308	-0.194	-0.209	-0.012		
	(0.026)		(0.034)	(0.031)	(0.026)	(0.001)		
4	0.429	1.000	-0.316	-0.160	-0.207	-0.014		
	(0.020)		(0.027)	(0.023)	(0.020)	(0.001)		
2	0.782	1.000					-0.291	-0.019
	(0.397)						(0.250)	(0.005)
8	0.418	1.000					-0.260	0.008
	(0.246)						(0.152)	(0.005)

Italy

Lags	Constant	*cy*	*fe*	*he*	*nw*	*Inf*
4	0.275	1.000	-0.201	0.228		
	(0.015)		(0.015)	(0.042)		
6	0.250	1.000	-0.176	0.266		
	(0.001)		(0.002)	(0.005)		
2	0.407	1.000			-0.125	0.007
	(0.033)				(0.021)	(0.002)

Japan

Lags	Constant	*cy*	*fe*	*he*	*nw*	*Irlr*	*Inf*
2	0.241	1.000	-0.228	-0.085			
	(0.012)		(0.017)	(0.019)			
4	0.199	1.000	-0.175	-0.089			
	(0.014)		(0.022)	(0.023)			
6	0.231	1.000			-0.059	0.001	0.017
	(0.025)				(0.011)	(0.001)	(0.002)

Note : The numbers in parentheses under the estimated coefficents are the standard errors.

cy = log (Private consumption / Disposable income)
fe = log (Financial wealth / Disposable income)
he = log (Housing wealth / Disposable income)
ow = log (Other wealth / Disposable income)
nw = log (Net wealth / Disposable income)

Irsr = Real short-term interest rate
Irlr = Real long-term interest rate
Irs = Nominal short-term interest rate
Irl = Nominal long-term interest rate
Inf = Inflation rate

BIBLIOGRAPHY

ANDO, A. and F. MODIGLIANI (1963), "The life cycle hypothesis of saving: aggregate implications and tests", *American Economic Review*, No. 53.

BÉRUBÉ, G. and D. CÔTÉ (2000), "Long-term determinants of the personal savings rate: literature review and some empirical results for Canada", *Bank of Canada Working Paper*, No. 2000-3, February.

BONNET, F. and E. DUBOIS (1995), "Peut-on comprendre la hausse imprévue du taux d'épargne des ménages depuis 1990?" *Économie et Prévision*, No. 121, Ministère de l'Économie, Direction de la Prévision.

BOONE, L., C. GIORNO, and P. RICHARDSON (1998), "Stock market fluctuations and consumption behaviour: some recent evidence", *OECD Economics Department Working Papers*, No. 208, Paris.

BOOTH, G.G., J.L. GLASCOCK, T. MARTIKAINEN, and T. ROTHOVIUS (1994), "The financing of residential real estate in Finland: an overview", *Journal of Housing Research*, Vol. 5, Issue 2, Fannie Mae.

BRADY, P.J., G.B. CANNER, and D.M. MAKI (2000), "The effects of recent mortgage refinancing", *Federal Reserve Bulletin*, July.

BRANDOLINI, A. and G. PARIGI (1997), "I consumi delle famiglie italiane", Banca d'Italia, Servizio Studi, February.

BRAYTON, F., M. DAVIS, and P. TULIP (2000), "Polynomial adjustment costs in FRB/US", Federal Reserve Board, *mimeo*.

CHURCH, K.B., P.N. SMITH and K.F. WALLIS (1995), "Econometric evaluation of consumers' expenditure equations", *Oxford Review of Economics Policy*, Vol. 10, No. 2.

DEATON, A. (1991), "Saving and liquidity constraint", *Econometrica* 59(6).

DICKEY, D. and W. A. FULLER (1979), "Distribution of the estimators for autoregressive time series with a unit root", *Journal of the American Statistical Association* 74.

DICKEY, D. and W. A. FULLER (1981), "Likelihood ratio statistics for autoregressive time series with a unit root", *Econometrica* 49.

DREES, B. and C. PAZARBASIOUGLU (1995), "The Nordic banking crises: pitfalls in financial liberalisation?", *IMF Working Paper*, WP/95/61, June.

EDEY, M. and K. HVIDING (1995), "An assessment of financial reform in OECD countries", *OECD Economics Department Working Papers*, No. 154, Paris.

ENGLE, R.F. and C.W.J. GRANGER (1987), "Co-integration and error correction: representation, estimation, and testing", *Econometrica* 55.

EUROPEAN MORTGAGE FEDERATION (2000), *Hypostat 1988-1998, Mortgage and Property Markets in the European Union and Norway, Comparison and Trends*, Brussels.

FREEDMAN, C. (1998), "The Canadian banking system", *Bank of Canada Technical Report*, No. 81, Ottawa.

FRIEDMAN, M. (1957), *A Theory of the Consumption Function*, Princeton University Press, Princeton.

GREENSPAN, A. (1999), *Mortgage Markets and Economic Activity*, Remarks before a conference on mortgage markets and economic activity sponsored by America's Community Bankers, Washington, DC, 2 November.

GRUNSPAN, T. and P. SICSIC (1997), "Les effets de richesse", *Rapport annuel*, Conseil National du Crédit et du Titre, Paris.

HAMNETT, C., M. HARMER, and P. WILLIAM (1991), *Safe as houses: Housing Inheritance in Britain*, Paul Chapman, London.

HUBBARD, R.G. *et al*. (1995), "Internal finance and firm investment", *Journal of Money, Credit and Banking* 27.

JAILLET, P. and R. SICSIC (1998), "Asset prices: relationships with demand factors and credit, and implications for monetary policy", *BIS Conference Papers*, Vol. 5, March, Basle.

JOHANSEN, S. (1988), "Statistical analysis of cointegrating vectors", *Journal of Economic Dynamic and Control* 12.

KENNEDY, N. and P. ANDERSEN (1994), "Household saving and real house prices: an international perspective", *Working Paper*, No. 20, Bank for International Settlements, Basle.

KENNY, G. (1998), "The housing market and the macroeconomy: evidence from Ireland", *Central Bank of Ireland, Technical Paper* 1/RT/98.

KENT, C. and P. LOWE (1998), "Property-price cycles and monetary policy", *BIS Conference Papers* Vol. 5, March, Basle.

MACLENNAN, D. (1990), Paper presented at the first conference of the LBS Housing Research Group, London, September.

MILES, D. (1995), *Housing, Financial Markets and the Wider Economy*, Series in financial economics and quantitative analysis, Wiley, New York.

MUELLBAUER, J. (1994), "The assessment: consumer expenditure", *Oxford Review of Economic Policy*, Vol. 10, No. 2, Oxford University Press, Summer.

NOGUCHI, Y. and J.M. POTERBA (1994), "Housing markets in the United States and Japan", *A National Bureau of Economic Research conference report*, The University of Chicago Press, Chicago and London.

OECD (2000), *OECD Economic Outlook* 67, June, Paris.

OGAWA, K., S. KITASAKA, H. YAMAOKA ,and Y. IWATA (1996), "An empirical re-evaluation of wealth effect in Japanese household behaviour", *Japan and the World Economy*.

OKUMURA, T. (1997), "Housing investment and residential land supply in Japan: an asset market approach", *Journal of the Japanese and International Economies* 11.

PATERSON, K. (1993), "Consumers' expenditure on nondurables and services and housing equity withdrawal in the United Kingdom", *University of Reading Discussion Paper*, No. 8, Centre for Quantitative Economics and Computing.

POTERBA, J.M. (1984), "Tax subsidies to owner-occupied housing: an asset market approach", *Quarterly Journal of Economics*, 99.

POTERBA, J.M. and J. MANCHESTER (1989), "Second mortgages and households savings", NBER Discussion Paper, No. 2853.

ROSSI, N. and I. VISCO (1995), "National saving and social security in Italy", *Ricerche Economiche* No. 49.

SOMMERVILLE, TSURIEL C. (1996), "The contribution of land and structure to builder profits and house prices", *Journal of Housing Research*, 7.

STATISTISKA CENTRALBYRAN (1999), "Nybyggnadskostnader för gruppbygda smahus och flerbostadshus 1998", *Statistiska meddelanden* (Bo 26 SM 9901).

TOPEL, R. and S. ROSEN (1988), "Housing investment in the United States", *Journal of Political Economy*, 96.

WESTAWAY, P.F. (1993), "Mortgage equity withdrawal: causes and consequences", *Discussion Paper* No. 59, National Institute of Economic and Social Research, London.

WILLIAMSON, J. and M. MAHAR (1998), "A survey of financial liberalisation", *Essays in International Finance*, No. 211, International Finance Section, Department of Economics, Princeton University, November.

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