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REAL ESTATE PORTFOLIO ALLOCATION: THE EUROPEAN CONSUMERS' PERSPECTIVE

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Real estate portfolio allocation: The European consumers' perspective ☆

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Abstract

Owner occupied housing facilitates household wealth accumulation and the stability of consumption in developed countries. It also contributes to other social goals. But owner-occupied housing is also a risky investment. This paper synthesizes existing knowledge about the riskiness of housing investment in European economies during the past quarter century. It also presents estimates of the potential gains to European consumers from investments in derivatives which may reduce risk at the individual level. We find that futures markets in house price indexes may increase portfolio returns for European investors by several percentage points at the same level of risk. We also consider practical steps to develop markets for these investments.

JEL classifications: G11; R21; G13

Keywords: Housing market risk; Diversification; Price index futures

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1. Introduction

Owner-occupied housing plays a unique role in developed countries such as the United States and Western Europe. This role encompasses the mobilization of individual savings and the stimulation of consumption, as well as the contribution of housing to a variety of non economic outcomes such as the production of "social capital" in various forms.

But owner-occupied housing is a risky investment. It represents a large fraction of household assets and net worth, and house prices have proven to be quite volatile, even in highly developed diversified economies. Thus, there are potentially large gains to policies which reduce the riskiness of investment in owner-occupied housing, especially for young households.

This paper provides new quantitative evidence on the ability of well-designed housing derivatives to reduce the riskiness of housing investment at the individual level. This evidence is presented for ten developed countries: eight continental European countries, the United Kingdom and the United States. We find that there are potentially large gains to households from investments in house price indexes and in other forms of risk reducing derivatives. Although our estimates are uncertain and are based upon annual data and short time series, we find that the opportunity to invest in house price indexes consistently increases risk-adjusted portfolio returns by several percentage points, not by several basis points.

In Section 2, below, we review the accumulating evidence on the unique role of housing in the economies of highly developed economies. In Section 3, we compare homeownership with investments in other forms of wealth, documenting the dominant position of home equities in wealth portfolios. In this section, we analyze the time series on housing prices for a panel of fourteen developed countries to document the riskiness of investment in modern industrial economies.

Section 4 presents new evidence on the potential gains which a derivative market might achieve. We begin by reviewing the results for Sweden reported by Englund et al., in 2002. We then use data from the Global Financial Data Base, together with the panel of housing prices analyzed in Section 3, to extend this work to ten countries. We find large gains to policies which encourage the hedging of housing risk.

Section 5 discusses some practical details in pursuing these policies, and it provides a brief conclusion.

2. The role of housing investment

By now the key role of housing in the health of national economies has been well established. This role has important microeconomic and macroeconomic components. On the micro side, homeownership has proven to be a powerful vehicle for wealth accumulation by owners, but also an important vehicle for renters as well. For current homeowners, the institutions facilitating the purchase of dwellings are almost perfectly aligned with household incentives to save.

The long-term self-amortizing mortgage contract means that most purchasers make fixed monthly payments over the twenty or thirty year life of the mortgage contract. These payments may not be easily distinguished from monthly rent payments, especially by less sophisticated households. Indeed, in the early years of a long-term mortgage, the monthly payments are in fact pretty similar to rent payments; they are mostly interest payments and only a small fraction goes to the retirement of principal. The correspondence between reg-

ular fixed payments and the regular enjoyment of service flows reinforces the perception that payments are simply rents (see Thaler, 1990). Moreover, the nature of the contract imposes dire penalties on those who fail to follow through on the program of forced saving embedded in a mortgage contract. It is hard to imagine another contract savings program which threatened low savers with eviction.

There is also increasing evidence that housing markets and housing prices influence the savings decisions of renters. For example, Yoshikawa and Ohtake (1989) analyzed the land and housing market in Japan, finding that increases in the prices of housing and raw land stimulated current savings among those who could reasonably expect someday to become homeowners. Engelhart (1996) found a similar effect of housing prices upon the savings behavior of renters seeking to become homeowners in Canada, and Sheiner (1995) reported analogous effects for the United States. Homeownership, or the prospect thereof, has been found to stimulate and facilitate savings among consumers.

The aggregate importance of the household savings facilitated by homeownership should not be underestimated. During the 1990s, much was made about the so called "savings puzzle" in the US, that is, the very low estimated savings rate among US consumers relative to the personal savings rates estimated for other developed countries, especially Japan. However, as shown by Gale and Sabelhaus (1999), if unrealized capital gains in housing are included in both the income and the savings of the household sector (as suggested by the original Haig-Simons criterion for defining income), then the aggregate personal savings rate in the US is much higher. In fact, household savings rates in the US are, according to these calculations, at about the same level as those in Japan, and are significantly higher than those in Europe.

On the macro side, there is increasing evidence that the wealth effects from homeownership have positively stimulated consumption, in the US and in other OECD countries. In comparison, there is more limited evidence, based upon aggregate time series data, that variations in stock market wealth do affect consumption (see Poterba, 2000, for a survey and Dynan and Maki, 2001, for more recent evidence.) But the estimated effects of financial wealth upon consumption are small.

In contrast, there is clear evidence that housing market wealth affects aggregate consumption. Moreover, the magnitude of the wealth effect is larger for housing wealth than for financial wealth. For example, Case et al. (2005) analyzed time series data for US states during 1982–1999 and for a panel of OECD countries during 1975–1999. For both samples, they found large and statistically significant effects of housing wealth upon household consumption.

For the panel of developed countries, for example, it is estimated that a 10 percent increase in housing wealth increases consumption by roughly 1.1 percent, while a similar increase in stock market wealth has virtually no effect upon consumption. Subsequently, these qualitative results have been confirmed by analogous time series analyses of Korean data (Kim and Lee, 2005) and Swedish data (Chen and Chen, 2005).

Homeownership and housing wealth have important economic consequences for individual consumers, and also for the economics in which they operate.

More recently, there has been increasing attention to the non-economic benefits of homeownership. In a series of papers, researchers have found that increased levels of owner occupation are related to increased voting and political participation (DiPasquale and Glaeser, 1999), to objective measures of neighborhood improvement (DiPasquale and Glaeser, 1999), to child outcomes (Haurin et al., 2002), to increases in private philanthropy

(Rossi and Webber, 1996), and to various measures of household "satisfaction." Some of the early evidence reported is not based upon adequate controls for the fact that homeowners are richer, better educated, and more socially advantaged than renters. But enough of the recent evidence is based upon credible instruments and statistical models that a positive relationship between homeownership *per se* and social outcomes seems quite reasonable.

3. Homeownership and other investments

At the individual level, it is instructive to compare homeownership (and hence home equity) with other components of household wealth: cash and bank accounts; stocks, bonds, and other securities; pension fund wealth; and consumer durables. Here, the overwhelming importance of homeownership in household wealth is striking. In Australia, for example, home equity is more than three times as important as stocks, bonds, other securities and bank account proceeds combined as a component of net worth (167 billion AUD versus 53 billion AUD, at the means, in 2001). Further inspection of the sources of household wealth reveals that virtually all non housing wealth is concentrated at the top of the wealth distribution. For example, at the third quintile, home equity was fully ten times as important as all financial wealth (stocks, bonds, securities, and bank accounts) combined, as a component of privately held wealth i.e., 250 Billion AUD versus 25 billion AUD at the mean. (See Caplin et al., 2005 for an extensive discussion of the Australian circumstance.)

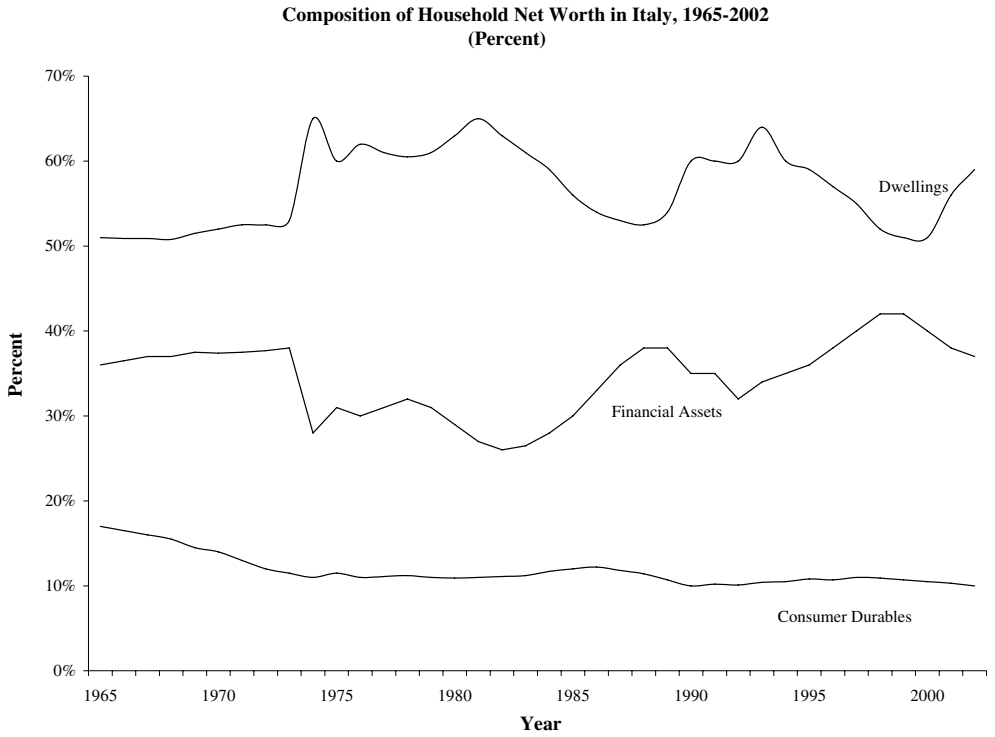

Fig. 1. Composition of household net worth in Italy, 1965–2002 (%).

Table 1
Levels and increases in home ownership in OECD countries

Country	Ownership rate (%)	Year	Annual increase (%)	Time period
Australia	70	1999	0.0	1994–1999
Austria	57	2001	—	—
Belgium	74	1999	—	—
Canada	66	2001	0.3	1991–2001
Czech Republic	47	2001	—	—
Denmark	55	1999	−0.1	1990–1999
Finland	71	2001	−0.8	1992–2001
France	56	2002	0.1	1990–2002
Germany	41	2001	—	—
Greece	80	2001	0.2	1987–2001
Hungary	92	2001	—	—
Iceland	78	2003	—	—
Lithuania	84	2003	—	—
Netherlands	53	1998	1.1	1993–1998
Portugal	76	1999	—	—
Slovenia	82	2002	1.3	1991–2002
Sweden	55	2002	0.0	1991–1997
UK	70	2002	0.3	1994–2002
USA	68	2002	0.3	1991–2002

Source: Scanlon, Kathleen and Christine Whitehead, *International Trends in Housing Tenure and Mortgage Finance*, London: Council of Mortgage Lenders, 2004, pp. 10, 13.

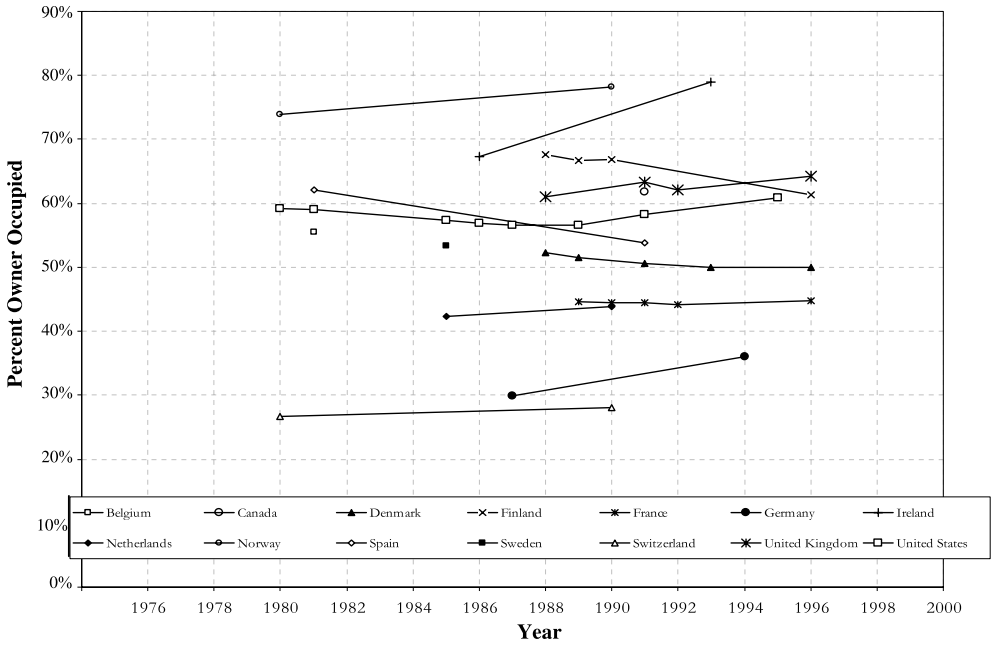

Fig. 2. Homeownership rates in OECD countries. Source: Case, K. E., et al, Home buyers, housing and the macroeconomy, 2003.

Fig. 1 provides another illustration. It reports time series information for Italy during the past 40 years. The figure indicates the importance of housing, financial assets, and consumer durables in the aggregate net worth of the household sector. During the entire period, housing never accounted for less than half of household wealth, and at some points it accounted for as much as 68 percent of private non pension wealth. Of financial wealth, which in the aggregate represented 27–42 percent of total wealth, savings accounts and government bonds represented more than half.

The major reasons for the importance of housing in private wealth and its increasing importance over time in developed countries are the high levels of owner occupancy and the increasing levels of homeownership over time. Table 1 reports national homeownership rates in a recent year for 19 developed countries. For 10 of these countries, owner occupancy exceeds 70 percent. And for two others, the US and Canada, rates of owner occupancy are only slightly below 70 percent. Of the other seven countries, three have had a long tradition of social rental housing (Denmark, the Netherlands, and Sweden), and their rates of homeownership are barely above 50 percent. But recent increases in homeownership rates have been highest in the Netherlands, averaging 1.1 percent per year during most of the nineties.

Fig. 2 summarizes changes in homeownership rates for those developed countries for which historical data are available. With the exception of Denmark and Finland, the trend in home ownership has shown a systematic increase. Note, however that mobility rates are lower in Europe. Thus, these trends in owner occupancy are consistent with a much larger increase in home purchase rates for those households making current tenure choices.

Table 2 disaggregates home ownership rates in those classified as "young entrant" households (defined as two adults aged 25 or younger, without children) and those classified as "mid life" households. As is clear from the table, much of the difference in

Table 2
Owner occupancy rates for young-entrant and mid life households and average loan-to-value (LTV) ratios

Country	Owner occupancy rates		Average LTV (%)
	Young entrant (%)	Mid life (%)	
Australia	47	80	95
Austria	48	64	—
Belgium	33	89	83
Canada	47	74	—
Czech Republic	29	48	40
Denmark	20	64	80
Finland	39	85	77
France	17	71	60
Germany	49	89	70
Hungary	95	96	70
Iceland	70	90	70
Lithuania	61	90	82
Netherlands	44	77	87
Slovenia	46	78	—
Sweden	46	85	85
UK	59	87	75
USA	62	81	76

Source: Scanlon, Kathleen and Christine Whitehead, *International Trends in Housing Tenure and Mortgage Finance*, London: Council of Mortgage Lenders, 2004, pp. 17, 29.

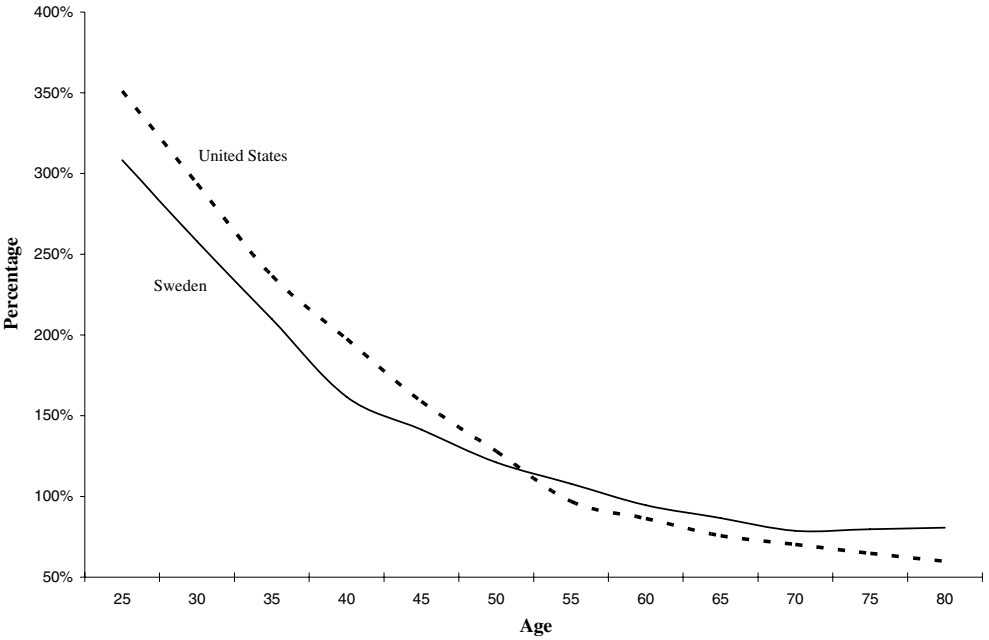

Fig. 3. Mean house value as a percentage of mean net worth: Sweden and the United States. Source: Englund, P, et al, Hedging housing risk, 2002.

homeownership rates between younger and older households reflects national differences in the customary loan-to-value ratios for newly issued mortgages. For example, in France younger households have only a 17 percent homeownership rate while the rate for older households is 71 percent. In part this difference reflects the fact that, in France, the average down payment is 40 percent of house value. Low homeownership rates among young households in the Czech Republic reflect, in part, the fact that average down payments are 60 percent of house value. Relatively few young households have the accumulated savings to afford such large down payments.

For those young households that can afford home purchase, the housing asset as a fraction of their net worth is frighteningly large. Fig. 3 reports estimates of that percentage as a function of age for Sweden and for the US. For the US mean house value is 350 percent of net worth for younger homeowners, aged 18–30. At older ages, the percentage is still large—159 percent for those aged 41–50 and 65 percent for those over the age of 70. For Sweden, the qualitative pattern is the same. For homeowning households aged 25–34, house values are 258 percent of mean net worth. Again, this percentage declines with age, but at age 75 mean house value is still about 80 percent of mean net worth.

This, of course, means that the wealth of homeowners, especially young homeowners, is very heavily dependent upon the course of housing prices. Alternatively, the risks to the financial well being of households are large if the volatility of housing prices is large.

Fig. 4A and B summarize all currently available information on housing price movements in developed countries. In each figure, the movement of housing prices is recorded from 1975 through 1998, relative to price levels observed in 1990. The variability in

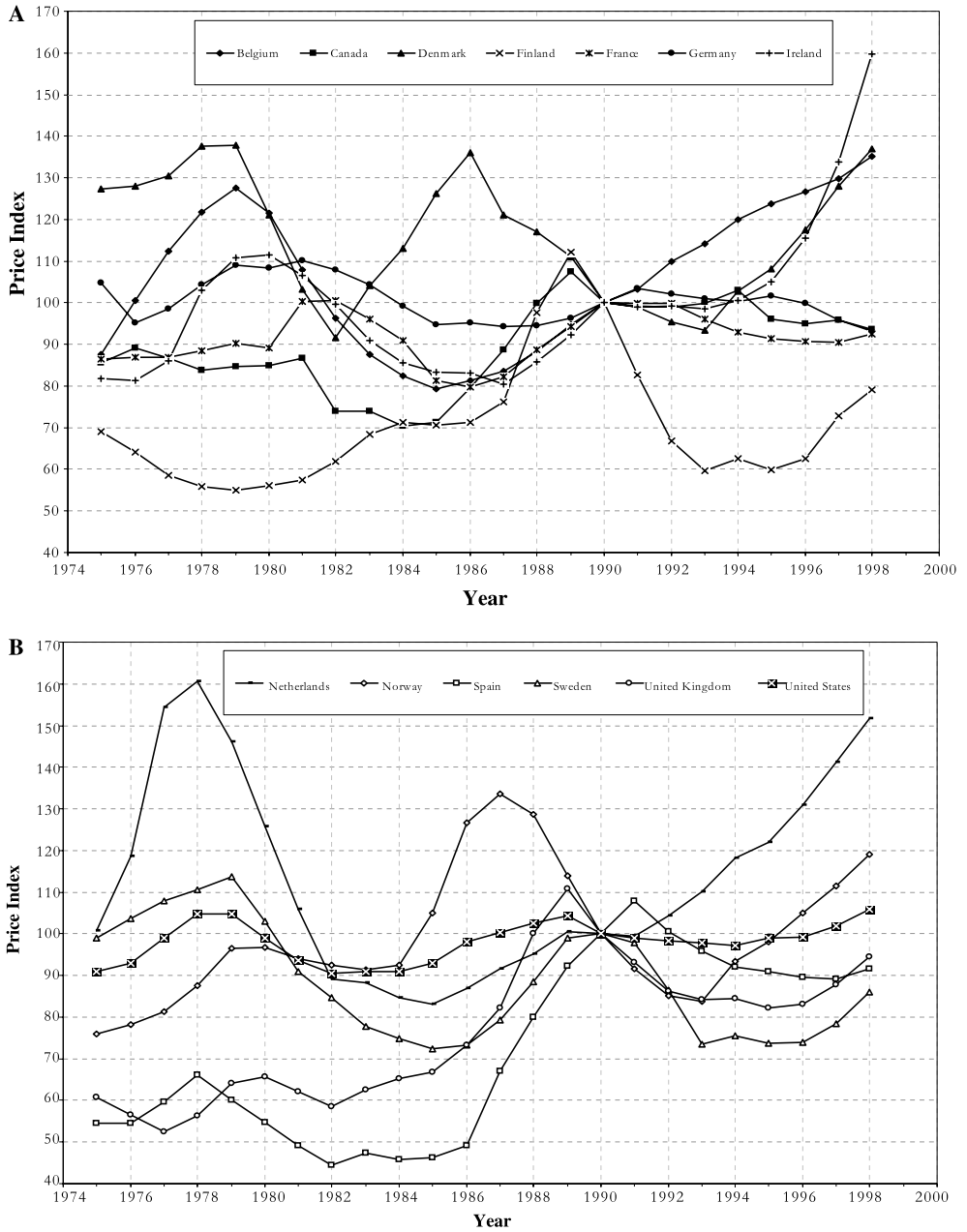

Fig. 4. (A and B) Evolution of real housing prices across OECD countries (1990 = 100). Source: Case, K. E., et al, Comparing wealth effects: the stock market versus the housing market, 2005.

housing prices is enormous. For example, Fig. 4A reports that house prices in Denmark declined by 35 percent between 1986 and 1990 and house prices in Finland declined by 32 percent between 1990 and 1992. House prices in Ireland increased by 60 percent

between 1990 and 1998. Fig. 4B reports a 50 percent increase in house prices in the Netherlands between 1990 and 1998 and a 33 percent decline in house prices in Norway between 1987 and 1990.

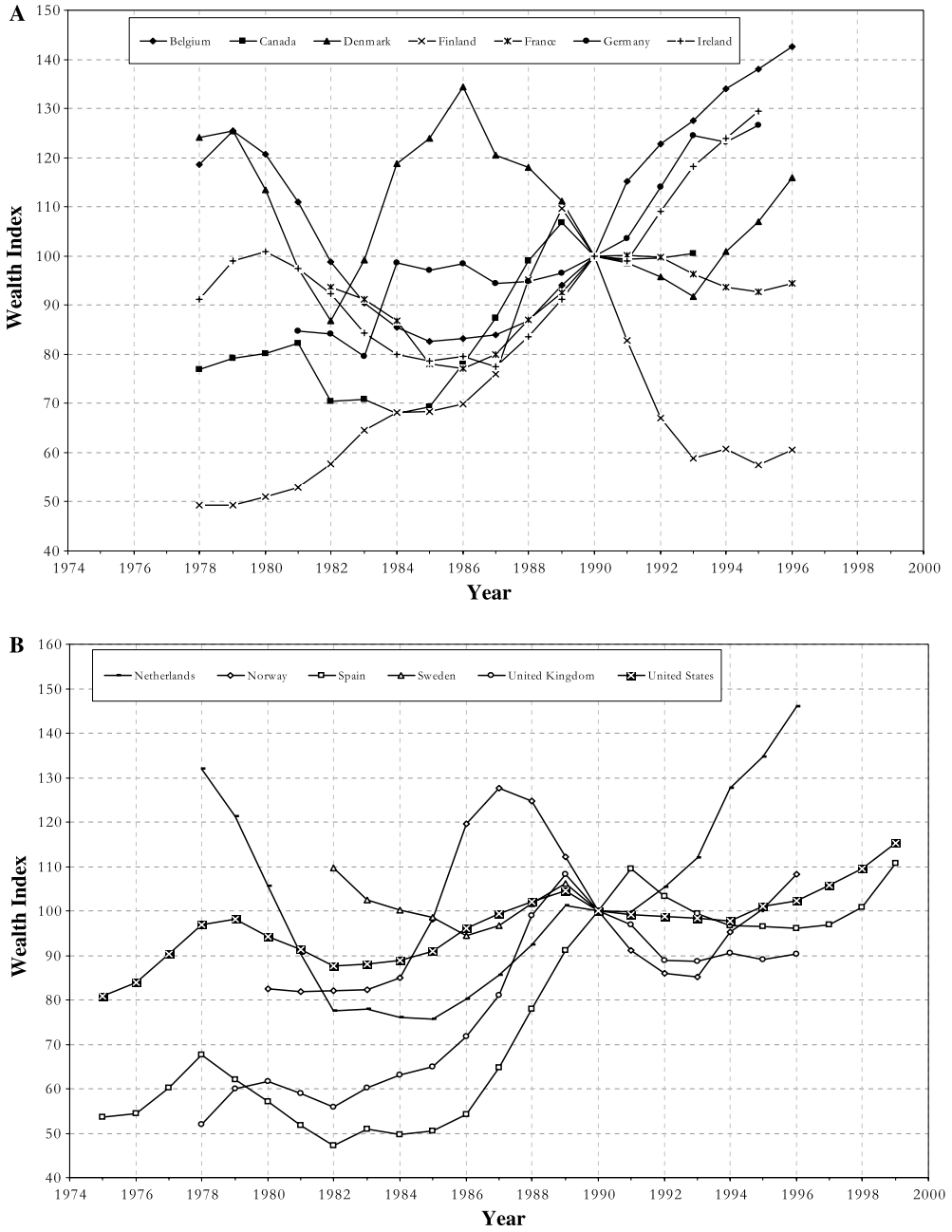

Fig. 5. Evolution of real housing wealth per capita across OECD countries (1990 = 100). Source: Case, K. E., et al, Comparing wealth effects: the stock market versus the housing market, 2005.

These changes in housing prices translate directly into volatilities in housing wealth. Fig. 5A and B report annual variations in owner-occupied housing wealth per capita relative to its level in 1990. Fig. 5A reports that housing wealth per capita declined by 40 percent in Finland between 1990 and 1993. Fig. 5B indicates that per capita owner occupied housing wealth doubled in Spain between 1984 and 1990.

The volatility of housing prices and the implied volatility of household net wealth is enormous. This volatility may not be of major concern if the mobility of households is sufficiently low. Indeed, as Sinai and Souleles (2003) have argued, for a household who will never contemplate a move from its current metropolitan housing market, homeownership provides a form of "consumption insurance," protecting the household from the potential increases in rent that may subsequently arise from price volatility. Mobility rates are somewhat lower in European countries than in the United States. Nevertheless, recent increases in residential mobility are pronounced, and the prospect of European integration will increase labor mobility in Europe and across of the European Union (EU) member states (Maclennan, 1996).

Table 3 reports these trends. As reported by the OECD, foreign workers from other EU countries increased by 229 percent between 1985 and 2000 in Denmark and increased by more than 100 percent in Luxemburg and in the UK. The percent increase in all foreign workers as a fraction of the labor force was 216 percent for Austria, almost 200 percent for Denmark, and over 100 percent for Germany, Luxemburg, Sweden, and the UK During a shorter period 1990–1999, foreign workers as a fraction of the labor force

Table 3
Increased labor mobility in selected countries

A. Percent increase in foreign workers from EU countries	
	1985–2000
Denmark	229
France	−29
Luxemberg	166
UK	107
B. Percent increase in foreign workers as fraction of the labor force	
	1985–2000
Austria	216
Denmark	193
France	−12
Germany	141
Luxemburg	150
Sweden	108
UK	121
	1990–1999
Belgium	216
Spain	193
Norway	229
Italy	302

Source: Organization for Economic Cooperation and Development, *Continuous Reporting System on Migration*, 1987 edition, 1989 edition. Trends in International Migration, 2002. Paris, OECD.

increased by more than 300 percent in Italy, by more than 200 percent in Norway and Belgium and by 193 percent in Spain. France is the only exception to these trends.

Of course, the data reported for "foreign workers" in Table 3 include low, skilled migrants as well as the middle-income salaried workers who might be expected to be attracted to homeownership. Casual empiricism and survey evidence, however, suggests that more highly educated Europeans and younger European workers are far more likely to consider working abroad. For example, in a survey of 2695 European youth aged 15–24 years (Fertig and Schmidt, 2003) 63 percent agreed that citizenship in the EU confers the right to work in any member country, and only 7 percent agreed that they had no interest in working or studying abroad.

This greatly increased international mobility of workers means that households are more directly exposed to losses in wealth arising from temporal variations in housing prices. For middle income households who contemplate careers requiring mobility across EU states, the amplitudes of wealth movements reported in Table 5 may be quite significant.

4. Reducing risk

The variability reported in Tables 2 and 3 suggests that there may be substantial benefits to policies which permit or encourage homeowners to hedge their lumpy investments in homeownership. The basic argument is put forward forcefully by Case et al. (1993). Englund et al. (2002) and Iacoviello and Ortalo-Magné (2003) have analyzed the issue empirically and both have estimated substantial gains to the establishment of derivative markets for housing prices. Table 4, simplified from Englund et al. (2002) reports the correlations among four assets available for investment by households in Stockholm during the 1990s. As reported in the table, the correlations among returns to investments in stocks, bonds, and t-bills are moderate, suggesting clear advantages to a diversified portfolio of investments. In the fourth column, we report the correlations when households are also permitted to invest in individual owner-occupied houses. As indicated in the table, the correlation between the returns to investment in individual houses and the stock market is very low, and the correlation between the returns to housing and bonds is negative. Clearly, housing investment increases the potential returns to Stockholm households. The final column adds the opportunity to invest in an index of housing prices to the set of investment alternatives. The housing index has the same expected return as investment in an individual house, but a different variance. As indicated in the table, with a five year horizon, the correlation is high, 0.73, but is not perfect.

Fig. 6 reports the financial implications of the higher variance in the course of prices for individual houses relative to the course of an index for housing prices. The dashed line

Table 4
Correlations among asset returns in Sweden 1990–2002 (five year horizon)

	Stocks	Bonds	T-bills	Houses	Housing index
Stocks	1.00	0.25	0.04	0.04	0.05
Bonds		1.00	0.69	−0.36	−0.49
T-bills			1.00	−0.26	−0.35
Houses				1.00	0.73

Source: Englund, P., et al, Hedging housing risk, 2002.

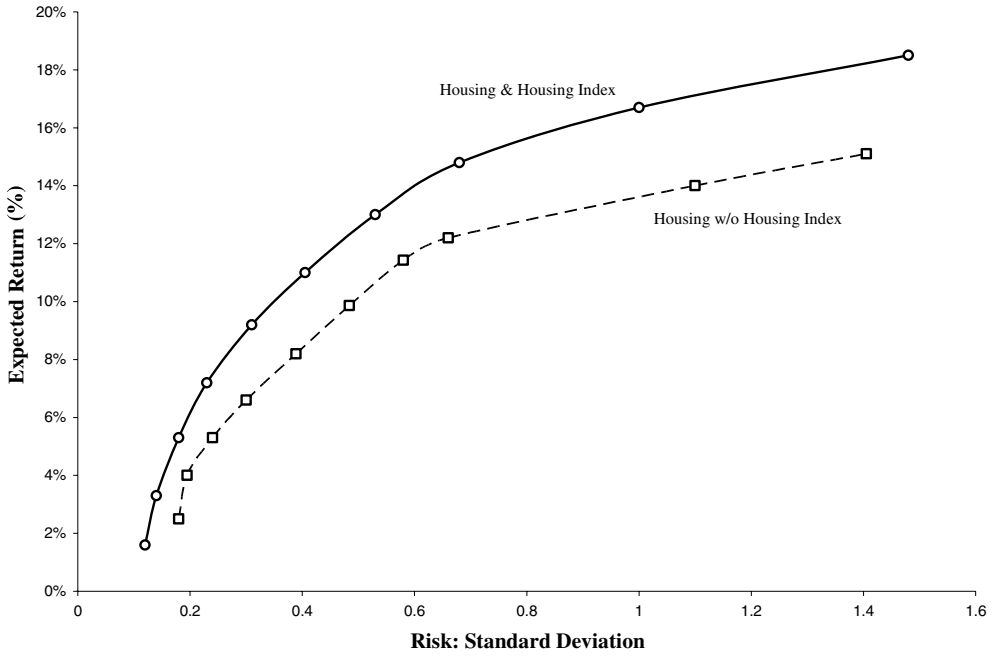

Fig. 6. Mean-variance efficient frontier for Swedish homeowners. Source: Adapted from Englund, P, et al, Hedging housing risk, 2002.

reports the efficient frontier—the tradeoff between the mean and the variance of returns—when consumers can invest in financial instruments and in the purchase of an owner-occupied dwelling. The frontier has the familiar convex shape reflecting the fact that higher average returns come at the expense of higher average risks. The solid line reflects the estimated frontier when households are also free to invest in an index of local housing prices. As indicated in the figure, the addition of this investment opportunity shifts the efficient frontier by a substantial amount. Indeed, households are able to earn an additional 1 or 2 percent portfolio return at the same level of risk by investing in the index. If this option were available, households would, at the time they purchased owner-occupied housing, sell the index of local housing prices. Over time, they would buy back the index. The tied transaction would reduce aggregate risk because returns to the two investments—individual houses and the house price index—are positively but imperfectly correlated.

5. Orders of magnitude of risk reduction in Europe

The evidence reported for Sweden in Section 4 was based upon an index of house prices for Stockholm estimated from transactions data (see Englund et al., 1998) and information on the relationship between individual prices and the price index. In particular, the empirical analyses underlying these estimates rely upon micro data on house sales to estimate distributions. The moments of these distributions were relied upon by Iacoviello and Ortalo-Magné (2003) in their related analysis of hedging housing market risk in London.

Table 5
Correlation of housing returns with returns to investment in t-bills, bonds, and equities

Country	Years	One-year time horizon			Five-year time horizon		
		T-bills	Bonds	Equities	T-bills	Bonds	Equities
Belgium	1975–1996	0.01	−0.02	−0.26	0.18	0.12	−0.36
Canada	1983–1996	−0.24	−0.23	0.13	−0.67	−0.07	0.57
Denmark	1975–1996	0.14	0.25	0.28	0.06	0.31	0.32
France	1975–1996	−0.39	−0.37	−0.27	−0.19	−0.24	−0.32
Netherlands	1975–1996	−0.15	−0.09	0.02	0.13	0.01	−0.09
Norway	1985–1996	−0.23	−0.04	−0.04	−0.66	−0.56	−0.16
Spain	1986–1996	−0.67	−0.16	−0.09	−0.95	0.47	−0.27
Sweden	1975–1996	0.05	−0.04	−0.03	0.18	0.23	−0.52
United Kingdom	1975–1999	0.02	0.04	−0.00	0.13	0.31	0.40
United States	1975–1999	−0.13	0.24	0.13	0.33	0.41	−0.03

Source: Returns for t-bills, bonds, and equities are computed from the Global Financial Database. Housing returns are computed from the data reported in Figs. 4A and B.

In this section, we present additional evidence for other European countries using the panels of housing price data reported in Fig. 4A and B and using financial data on the prices of t-bills, bonds, and equities for each country from the Global Financial Database. The housing price and financial data cover various periods from 1975 to 1999 and are reported annually. The data consist of panels of 25 annual observations for two countries (the US and the UK, 1975–1999) and 22 observations for five countries (Belgium, Denmark, France, the Netherlands, and Sweden, 1975–1996). Fourteen annual observations are available for Canada (1983–1996), and 12 are available for Norway (1985–1996). Eleven observations are available for Spain (1986–1996).

By subtraction, we create a panel of observations on the annual returns to investment in t-bills, bonds, equities, and a housing index. An index of prices for individual houses was constructed using the same procedure adopted by Iacoviello and Ortalo-Magné (2003) to adapt Swedish data for their analysis of London.[1]

Based upon these panels of aggregate returns of differing lengths, the variance-covariance matrix of annual investment returns was estimated for each country. Table 5 summarizes the covariances in returns between investments in the housing index and investments in other assets: t-bills, bonds, and equities. For each country, the table reports the correlation between investment in housing and in the three other assets. It is clear from the table that the short-term correlations are quite low. The highest correlations are between housing returns and bonds in the US and in Denmark (0.28) (0.24–0.25) and the correlation between housing returns and equities in Denmark. Of the correlations reported in the table, for a one-year time horizon, 19 are negative. When the time horizon is extended to five years, the simple correlations in returns are higher, up to 0.95 for t-bills and housing for Spain (but note that the computations for Spain are based upon ten observations on

[1] Iacoviello and Ortalo-Magné use an annual autocorrelation coefficient of 0.0256 for London, relying upon results reported for Sweden by Englund et al. (1998), Table 4. To be conservative, we use an autocorrelation coefficient of 0 which implies that the individual house is less volatile at all investment horizons, thus reducing the benefits of allowing households to invest in house price indexes.

annual returns). Most of the simple correlations are well below 0.5. This suggests that there are substantial returns to the inclusion of housing in the investment portfolio.

For each country, we solve for the set of efficient unlevered portfolios using a one-year time horizon. The efficient portfolios represent the highest expected return for a given standard deviation in returns (i.e., for a given riskiness in the portfolio). We solve for the efficient frontier when households can invest in t-bills, bonds, equities, and owner-occupied housing. We also solve for the frontier when households can also invest in an index of house prices, i.e., the national price indexes reported in Fig. 4A and B. Table 6 summarizes the results of these calculations. The entries in the table are the increases in expected investment returns at a given level of risk (i.e., standard deviation in returns) which arise when homeowners are also afforded the opportunity to invest in the index of national home prices. The portfolio solution involves buying an owner-occupied dwelling and selling the index, that is, hedging home purchase by selling short an index of house prices.

Panel A in the table reports the increases in returns when the volatility of prices for individual houses is "low" (1.33) relative to the volatility of the house price index. As the entries in the table suggest, the introduction of this investment opportunity increases returns for any given level of risk, and reduces investment risk for any specified level of returns. For example, for Belgium at low levels of risk (a standard deviation of 0.50–0.75), the opportunity to trade in house price derivatives increases nominal investor returns by 0.7–1.4 percentage points. At higher levels of risk (a standard deviation of 1.00), hedging increases expected nominal investor returns by 0.5 percentage points.

The advantages which arise when this object of investment is available are much greater in Canada, Denmark and Norway. At low levels of risk, average returns are increased by 2–4 percentage points in Canada and by about 4 percentage points in Denmark.

When the volatility of individual housing prices is "high" (1.71) relative to the volatility of the house price index, the estimated gains arising from the opportunity to hedge are much greater. At the same levels of risk, nominal returns are 2–3 times larger when the volatility of house prices is greater. In almost all cases, the returns to individual consumers are substantial (Spain is a conspicuous exception, but the time series for Spain is perilously short).

Table 7 provides another summary of calculations relevant to evaluating the benefits of hedging. The table presents the probability that the additional returns arising from allowing short sales of the house price index will be negative. As the table indicates, with "low" volatility of individual house prices these probabilities are quite small, suggesting that most of the time the opportunity to hedge housing market investments will lead to higher investment returns. Only for the Netherlands, Spain and the UK are the entries in the table large, 0.22–0.49. Of course, the Netherlands is the country with the lowest expected return from hedging. But even for the Netherlands, the probability of increased investor returns from hedging is well above half.

The results presented in Tables 6 and 7 are precise, but of course they are highly uncertain. They are based upon the only house price indexes available, but not micro data on house sales. The results are based upon a sequence of short time series of annual observations, and they consider only a few highly aggregated asset classes.[2] Nevertheless, the

[2] They are also based on quite conservative assumptions. For example, in these calculations homeowners are not constrained to allocate a large fraction of their wealth to housing. In the market, younger and poorer home purchasers may be quite constrained to devote large shares of their wealth to housing assets.

Table 6
Increased return in percentage points from hedging housing risk, at various levels of risk

Country	Standard deviation of returns															
	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25
A. Low variance																
Belgium	1.35	1.10	0.93	0.86	0.77	0.69	0.66	0.57	0.54	0.53	0.49	0.45	0.42	0.42	0.38	—
Canada	1.95	1.56	1.32	1.19	1.04	0.20	0.15	—	—	—	—	—	—	—	—	—
Denmark	4.27	2.47	1.85	1.62	1.30	1.23	1.07	0.92	0.92	0.84	0.84	0.77	0.77	0.70	0.62	0.62
France	0.87	0.69	0.63	0.52	0.47	0.47	0.41	0.36	0.36	0.31	0.32	0.26	0.27	0.21	0.29	0.22
Netherlands	0.37	0.37	0.43	0.43	0.49	0.55	0.55	0.67	0.67	0.78	0.79	0.85	0.96	0.96	1.02	—
Norway	3.51	3.81	3.96	3.46	2.73	2.22	2.01	1.79	1.65	1.43	1.37	1.29	1.22	1.08	1.09	1.02
Spain	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01
Sweden	0.81	0.82	0.91	1.00	1.09	1.18	1.19	1.28	1.28	1.13	1.14	1.07	0.92	0.92	0.93	0.85
United Kingdom	0.26	0.26	0.30	0.33	0.36	0.40	0.47	0.51	0.54	0.58	0.61	—	—	—	—	—
United States	0.35	0.32	0.30	0.27	—	—	—	—	—	—	—	—	—	—	—	—
B. High variance																
Belgium	3.83	3.62	3.29	3.01	2.63	2.34	2.14	1.98	1.82	1.74	1.61	1.49	1.42	1.34	1.30	—
Canada	5.51	5.14	4.66	4.09	3.61	2.13	0.59	—	—	—	—	—	—	—	—	—
Denmark	12.73	11.02	9.07	6.98	5.26	4.48	3.94	3.47	3.17	2.93	2.78	2.55	2.39	2.25	2.09	2.01
France	2.93	2.51	2.15	1.80	1.63	1.46	1.35	1.25	1.20	1.10	0.99	0.94	0.89	0.84	0.87	0.75
Netherlands	0.85	0.96	1.14	1.25	1.43	1.55	1.72	1.90	2.07	2.25	2.43	2.60	2.83	2.95	2.90	—
Norway	8.32	9.06	9.59	9.54	9.03	8.31	7.52	6.57	5.78	5.20	4.70	4.41	4.13	3.77	3.56	3.35
Spain	0.11	0.10	0.10	0.04	0.03	0.03	0.10	0.03	0.03	0.09	0.02	0.02	0.08	0.01	0.01	0.08
Sweden	1.91	2.01	2.20	2.46	2.55	2.73	2.91	3.01	3.19	3.12	3.14	3.16	3.02	3.03	2.88	2.82
United Kingdom	0.65	0.72	0.79	0.86	0.96	1.04	1.11	1.19	1.25	1.43	1.63	—	—	—	—	—
United States	1.27	1.13	0.99	0.89	—	—	—	—	—	—	—	—	—	—	—	—

Note: Entries are for areas of common support on the standard deviation. Households are constrained to short and long positions of less than 500% of wealth in any investment category, including housing. Panel A reports the results assuming a ''low'' ratio of the variance of housing prices relative to the variance of housing price indexes (1.33, following Iacoviello and Ortalo-Magné, 2003 Table 1). Panel B reports the results assuming a ''high'' variance of housing prices relative to the variance of house prices indexes (1.71, following Englund et al., 2002, Table 2).

Table 7
Probability of loss in percentage points from hedging housing risk, at various levels of risk

Country	Standard deviation of returns															
	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25
A. Low variance																
Belgium	0.003	0.023	0.061	0.093	0.136	0.179	0.205	0.251	0.264	0.288	0.312	0.334	0.351	0.357	0.376	—
Canada	0.000	0.002	0.014	0.034	0.069	0.395	0.426	—	—	—	—	—	—	—	—	—
Denmark	0.000	0.000	0.001	0.006	0.032	0.051	0.091	0.140	0.153	0.188	0.200	0.232	0.242	0.271	0.303	0.310
France	0.041	0.105	0.147	0.212	0.251	0.265	0.304	0.336	0.345	0.372	0.374	0.402	0.403	0.428	0.405	0.430
Netherlands	0.230	0.251	0.237	0.254	0.242	0.232	0.246	0.215	0.228	0.206	0.215	0.209	0.191	0.202	0.198	
Norway	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.018	0.033	0.066	0.085	0.110	0.134	0.174	0.182	0.207
Spain	0.476	0.485	0.480	0.482	0.489	0.489	0.490	0.491	0.491	0.492	0.496	0.496	0.493	0.497	0.497	0.497
Sweden	0.053	0.068	0.065	0.062	0.060	0.058	0.068	0.066	0.077	0.117	0.127	0.154	0.201	0.212	0.219	0.248
United Kingdom	0.302	0.318	0.309	0.306	0.304	0.297	0.278	0.274	0.274	0.271	0.271	—	—	—	—	—
United States	0.242	0.280	0.309	0.339	—	—	—	—	—	—	—	—	—	—	—	—
B. High variance																
Belgium	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.010	0.022	0.034	0.054	0.078	0.098	0.122	0.139	_
Canada	0.000	0.000	0.000	0.000	0.000	0.002	0.230	—	—	—	—	—	—	—	—	—
Denmark	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.008	0.015	0.025	0.041	0.054
France	0.000	0.000	0.000	0.003	0.010	0.026	0.046	0.071	0.091	0.123	0.161	0.185	0.209	0.233	0.234	0.274
Netherlands	0.045	0.040	0.029	0.027	0.021	0.019	0.016	0.013	0.011	0.009	0.008	0.007	0.005	0.005	0.008	—
Norway	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.004
Spain	0.413	0.428	0.434	0.475	0.483	0.484	0.450	0.486	0.487	0.462	0.492	0.492	0.471	0.497	0.497	0.474
Sweden	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.003	0.004	0.008	0.012
United Kingdom	0.097	0.095	0.094	0.093	0.085	0.083	0.083	0.081	0.082	0.066	—	—	—	—	—	—
United States	0.006	0.020	0.049	0.085	—	—	—	—	—	—	—	—	—	—	—	—

Note: Entries are the *p*-values for a test of the differences in mean returns for a given standard deviation in returns.

results are highly consistent across countries, and they reinforce the more detailed analyses of the Stockholm and London housing markets described previously. The benefits to consumers of hedging in European housing markets are on the order of several percentage points, *not* several basis points.

6. Practical details

The results reported for a panel of developed countries suggest that the ability to invest in house price derivatives increases investor returns, on average, by several percentage points for the same level of risk. The results also suggest that the probability that investor returns are decreased at any given level of risk is small—only for the Netherlands is the probability at all large. It would seem that there is a substantial benefit to gathering and processing the sort of information that would form the basis for replicable and routinely produced indices of housing prices—for a metropolitan area or region, or in some cases for an entire country.

The obstacles to a functioning market that would allow European consumers to reduce the riskiness of their investment portfolios are partly technical and partly organizational. On a technical level, index development requires that there be a reputable and replicable method for building and publishing the house price index. And this requires large samples of data.

It may thus be somewhat surprising to learn that sufficient data to publish such an index regularly is apparently routinely collected and is already available centrally for many industrial countries. Table 7 reports on the taxation of owner-occupied housing for OECD countries. As indicated in Panel A, at least eight countries have some form of national taxation on housing capital, and another eight countries administer some form of *ad valorem* tax at the local level. For those countries that tax housing nationally, it is necessary to have some centralized repository for housing data, typically including sales prices and the hedonic characteristics of dwellings. For Sweden, for example, all house sales are recorded and matched to the hedonic characteristics of dwellings in each region (see Englund et al. (1998)). Similar, but less detailed, information is recorded for dwellings in Norway. These data are used for tax assessment and mass appraisal by the authorities who administer national systems of property taxes.

In principle, these data could be used to produce house price indexes for local or national markets using hedonic methods. Indeed, in some part, these data are already used by government officials to produce national and regional price estimates.[3] It would seem to be a straightforward matter to publish the methods used to produce price estimates and to update price indices regularly—for wide distribution to the financial community.

But for some countries listed in Table 8, it is true that houses are reassessed only irregularly for tax purposes. So developing a market for hedging housing risk would provide some incentives for more modernized assessment practices.

For those countries which do not collect housing price and sales information nationally, the development of a credible and reliable house price index is a bit more complicated. For the US, house price indexes for local markets are estimated and reported by a national

[3] See Statistics Sweden (http://www.scb.se/templates/tableorchart_74161.asp) for an example of the use of these data to produce a national price index by a government agency.

Table 8
Taxation of owner occupied housing in OECD countries

A. National assessments and taxation
Denmark[a]
Greece
Italy[a]
Netherlands[a]
Norway
Spain[a]
Sweden
Switzerland
B. Local assessments and taxation
Austria
Belgium
Finland
France
Germany
Iceland
United Kingdom
United States

Note: [a] Owner occupants are also taxed on house values at the local or regional level.
Source: Englund, P, Taxing residential housing capital, 2003.

government agency.[4] These data are reported quarterly for some 300 metropolitan areas and local markets. These indexes rely upon repeat sales (Case and Shiller, 1989) for the development of price indexes, rather than hedonic methods. Recent work has compared the implications of repeat sales methods with hedonic methods for the accuracy of price indexes (Clapham et al., 2006). The repeat sales index seems to perform well in comparison with a chained Fisher Index estimated using hedonic characteristics. In any case, the goal need not be a perfect representation of unobserved house prices, but rather an index which is reasonably accurate and easily replicable.

Finally, it should be noted that in some countries without government centralized house price information (e.g., the UK), banks and financial institutions currently produce and distribute price indexes which are widely regarded as reliable and are used extensively in the financial community.[5]

The organizational barriers to establishing a market in house price indexes may be more formidable than the technical barriers. The advantages to portfolio investors, hedge funds and financial instructions of participating in this market are, perhaps, as obvious as are the advantages to consumers. By taking the long position, i.e., by buying the index from consumers, these institutional investors have, for the first time, direct access to investments in owner occupied housing, by metropolitan area, region, or country. This increases investment opportunities and reduces the aggregate risks to institutions.

In developing a market, it is probably important to mobilize potential purchasers of these indexes—large institutions—as well as individual property investors. A form of this

[4] The Office of Federal Housing Enterprise Oversight.

[5] For example, the Halifax Bank of Scotland (HBOS) has produced house price indexes for 15 regions in the UK quarterly since 1990. More disaggregated regional data have been published since 1997. Other HBOS indexes are widely used by government departments in the UK as well as businesses.

investment was offered for several years in the UK, before disappearing in 2004. Two firms, IG Index and City Index (see Tricks, 2003), offered investors the opportunity to purchase or sell an index of regional house prices, for settlement one to four quarters subsequently. These investments, an example of a rather common form of "spread betting" in the UK, permitted investors to hedge local housing prices, but only for short periods.[6]

The indexes for these "spread bets" were based upon the Halifax Bank of Scotland regional house price surveys and London land registry transactions. Trading in both these markets was thin and the products were withdrawn in 2004. One lesson from this experience is that it is important to induce portfolio investors and large institutions, not just individual investors and speculators, to develop a thick market. As a correlary, it is probably important to offer index positions longer than four quarters of duration in order to develop an orderly market.

The recent announcement by Macro Securities and the Chicago Mercantile Exchange (CME) to begin trading on housing futures using repeat sales price indexes for ten large US metropolitan regions seems better designed to attract institutional investors, hedge funds, builders, and mortgage lenders. The advance publicity surrounding the announcement suggests that "A builder putting up a $100 million subdivision outside Chicago ready for sale in 2008 could buy puts on the Chicago housing index that expire in the summer of 2008. If the housing market plummeted and the company took a bath on the McMansions, it would recoup a chunk of the losses on the rising value of the puts." (Gross, 2005). The article continues "But it's unlikely that the people who could most benefit from hedging—individuals—will be big users. Why? These options will cover large markets—it will be tough to hedge the value of your own house, which depends so much on your particular neighborhood. The New York Index covers single family residential homes from the Jersey Shore to New Haven, Conn., a remarkably heterodox stretch. . .."

The size of the contracts may be unsuitable for some individual household investors. The contract size as listed in the CME research report (Labuszwski, 2005) is about $65,000. With conventional margin requirements, this is a minimum investment of about $6500. It is now anticipated that trading on this derivative market will begin in 2006. Many investors and many homeowners have a stake in the success of markets such as these.

And this success is at least as important for European homeowners as it is for US consumers.

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[6] The system worked in the following way. The market maker quotes a buy-sell spread, say 110–120. Optimistic investors would buy at 120; pessimistic investors would sell at 110. When prices move in the next period to, say, 140–150, investors can reverse their trading, closing out positions, and realizing profits (20 for the optimist) and loses (40 for the pessimist). See Quigley and Ward (2003), for further discussion.

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