Owner-occupied housing and household asset allocation
A review of the issues

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Abstract *This second of two related papers in this Journal, reviews empirical evidence available from the literature on the problem of household's optimal portfolio when owner-occupied housing is included in the list of available assets, namely the risk-return performance of residential investment, and its usefulness in efficient mixed-asset portfolios. The risk-return characteristics of the housing asset is highly dependent on the type of perspective under analysis (household or institutional investor's perspective) and therefore, the two housing investment approaches could lead to different conclusions about the role of housing investment in an portfolio context. The consumption demand for housing together with the markets imperfections place serious constraint on the household's portfolio problem.*

Introduction

This is the second of two related papers published in this journal. The first paper (housing investment in an institutional portfolio content review of the issues) surveys the role of residential property in an institutional portfolio context and finds evidence that residential property is a more effective hedge against inflation than bonds and shares. Additionally, that paper shows that unsecuritized housing investment not only generates risk-adjusted returns comparable to those of bonds and shares, but also exhibits low levels of correlation with classic institutional asset classes. This second paper reviews empirical evidence available from the literature on the problem of a household's optimal portfolio when owner-occupied housing is included in the list of available assets, namely the risk-return performance of residential investment, and its usefulness in efficient mixed-asset portfolios (Englund *et al.*, 2000; Flavin and Yamashita, 1998; Goetzmann, 1993). There are a number of reasons why housing investment in an institutional portfolio context is not entirely comparable to the perspective of a household investor. For instance, portfolio constraint imposed by housing consumption ("housing constraint") has a critical influence on how households allocate wealth amongst alternative assets. Additionally, the household is not able to benefit from the risk and operational costs reduction created by holding large diversified housing portfolios.

The paper is structured as follows. The next section reviews the literature on owner-occupied housing in a household portfolio, identifies some weaknesses with the housing diversification benefits argument and discusses future research directions. The third section explores some theoretical explanations of property's diversification characteristics. Conclusions are drawn in the last section.

Residential property in a household portfolio context

As mentioned earlier housing investment in a multi-asset portfolio context is considered from two substantially different perspectives: institutional investor's perspective, in the earlier paper and the household's perspective. The risk-return characteristics of the housing asset is highly dependent on the type of perspective under analysis and therefore, the two housing investment approaches could lead to different conclusions about the role of housing investment in a portfolio context.

Housing is a dominant asset category in a household's wealth portfolio and one of the most important components of household consumption is the expenditure. For instance, the average US homeowner holds 88 percent of his non-pension wealth in home equity and the average household in Western Europe and US spends between 25 to 35 percent of its income on housing services (Englund *et al.*, 2000).

Housing services consumption is essentially determined by the household's ownership of residential property. Thus, the household's demand for housing, which could be optimal from the point of view of the consumption of housing services, may differ from the optimal level of housing allocation in a purely portfolio investment context. In other words, the portfolio constraint imposed by the housing consumption ("housing constraint") has a critical influence on how households allocate wealth among alternative assets.

Households would like to consume an optimal mix of consumption good and housing services and maintain a balanced wealth portfolio and, at the same time, to reduce the residential transaction costs. However, housing markets have several imperfections such as tax distortions, transaction costs and moral hazard issues. According to Flavin and Yamashita (1998), those market imperfections prevent households from holding a diversified portfolio and renting to satisfy their housing services consumption. In that sense, rental housing is not a perfect substitute for owner-occupied housing. Other market frictions that influence homeowners' wealth portfolio include uninsurable labour income risk and borrowing constrains (Cocco, 2000). The latter author states that labour market incompleteness avoid human capital to be capitalized and its risk insured. The author finds empirical evidence that both labour income and interest rate risk crowed out housing investment. Grossman and Laroque (1990) show that the transaction costs reduces the percentage of household's wealth allocated to risky assets (e.g. shares) after he purchases a new house. Following Grossman and Laroque (1990), Cocco (2000) finds that transaction costs decrease the frequency of housing adjustment and restricts investor's ability to take advantage of serial correlation in house prices.

By investing in large housing portfolios, the institutional investor has, relative to the household investor, a lower risk exposure and higher net returns. Diversification (e.g. geographical diversification) that results from holding a larger residential portfolio, can improve investor welfare by reducing the exposure to any specific risk borne by any single house. Additionally, the institutional investor benefits from considerable economies of scale. In other words, size enables institutions to have lower operating costs per amount of residential investment, and hence, higher net returns.

Papers by Devaney and Rayburn (1988), Goetzmann (1993), Flavin and Yamashita (1998), Englund *et al.*, (2000), Eichholtz *et al.*, (2000) and Gatzlaff (2000), using different procedures to measure housing returns, have all analysed the problem of households' optimal portfolio when owner-occupied housing is included in the list of available

assets. Their findings also confirm the institutional portfolio studies that correlations between housing and other assets are low. However, when they look at housing investment within a mean-variance framework, the precise amount of residential assets to include in optimal portfolio is not the same for both types of investors.

Devaney and Rayburn (1988) examine the role of residential property in the household investment portfolio, with capital appreciation returns based on a transaction price index for Memphis (US) over the period 1970-1984. They find empirical evidence of low correlation between residential property investment and financial assets (shares, short and long term bonds). Additionally, they suggest that there are low incremental benefits of diversification across housing submarkets[1] in the same city. One note of caution in reading the empirical results is that the authors use a housing appreciation return instead of a total housing return.

Goetzmann (1993) also examines the role of single family homes in the investors' portfolio, with capital appreciation returns based on a value-weighted repeated-sales index[2] in four urban US markets over the period 1971-1985. The author finds that there are potential allocations for home investment in optimal portfolios comprising of shares and bonds, although housing is not the predominant asset class and the proportion of those allocations increases with the risk aversion of the investor. The potential diversification benefits result is due primarily to the weak correlation between housing returns and those of financial assets. Additionally, the paper confirms the findings of Goetzmann and Ibbotson (1990) about the geographical diversification benefits within residential property. The author presents evidence that even by diversifying across four houses, one in each regional market, it is possible to reduce the risk significantly. Furthermore, the study suggests that owning four homes in different parts of the country generates risk-adjusted returns comparable to owning a fraction of a portfolio composed of thousands of properties within a single region. In other words, regional diversification dominates local diversification. Goetzmann further observes that given the short time interval of analysis, one must be cautious in generalising the results obtained regarding suggestions for future investment. Nevertheless, according to the author, allocation studies based upon inputs derived from longer time intervals suggest that housing may command an even larger percentage of the portfolio.

Flavin and Yamashita (1998) using data from the Panel Study of Income Dynamics (PSID)[3] on home values, compute real after-tax returns to owner-occupied housing from 1968 to 1992. They report that owner-occupied housing returns and standard deviation are slightly lower than those of shares. The authors also indicate that housing returns are weakly correlated with those of financial assets (mortgages, short- and long-term government bonds, and shares). Their empirical results show that households hold different portfolios of financial assets because the constrain imposed by the housing consumption varies considerably across households. In fact, the ratio of housing investment to net worth declines over the household's life-cycle, inducing a life-cycle pattern in the household's portfolio. Furthermore, they argue that owner-occupied housing is an attractive asset for hedging fluctuations in financial assets.

Recently, Englund et al., (2000), using a quarterly repeat sales house price index for eight major Swedish regions between 1981 and 1993, examine the owner-occupied housing investment in a multi-asset optimal portfolio (short- and long-term bonds, market share index, and an index for real estate corporations traded on Stockholm

share exchange) over different holding periods. The authors report that returns to housing are positively correlated with real estate shares and negatively correlated with bonds, and all correlations with housing are stronger at longer periods of time. The correlation with market share index is nearly zero. Moreover, they point out that for short-holding periods, housing allocation in an optimal portfolio is nearly zero. On the other hand, for longer periods, low risk portfolios contain 15 to 50 percent on housing. In disagreement with the Hoesli and Hamelink (1997) findings for Switzerland, the authors indicate high correlations between housing returns across the different regions of Sweden during the sample period. As a consequence, the diversification benefits from holding a multi-regional housing portfolio within Sweden appear to be negligible.

Using a quarterly value-weighted repeated-sales index for Florida during the 1970-1999 period, Gatzlaff (2000) finds that housing returns are negatively correlated with those on long-term government bonds, shares, and real estate investment trusts and positively weakly correlated with equity REIT total returns. Moreover, the paper shows evidence that housing assets allocation has potential benefits for mixed-asset portfolios. They find that the efficient allocation of housing in these portfolios ranked from 20 to 45 percent. Furthermore, the paper argues that housing assets reduce the efficient institutional portfolios' allocations to non-residential property. Thus, the institutional investor should optimise not the plan's investment portfolio, but rather the wealth of individuals' personal portfolio (members of the plan). This argument, however, seems not valid for defined-benefit pension funds and life insurance companies, because their liabilities tend to be defined in nominal terms.

Another recent study, Eichholtz et al., (2000), rely upon monthly value-weighted repeat-sales index during the period 1980-1997 for five major US' cities, to analyse the performance of owner-occupied residential property in portfolios relative to shares and bonds. The study reports that the housing property returns (measured by the appreciation return component) and standard deviation have been lower than those of shares and bonds. Additionally it shows that correlations between housing and financial assets are small. In concordance with Hoesli and Hamelink's (1997) results (for Switzerland) and in disagreement with the findings of Englund et al., (2000) (for Sweden), the paper shows evidence of diversification benefits from holding a multi-regional housing portfolio within the US, since the relationship between the different regional housing markets is not significant. In contrast to the Gatzlaff argument, the study shows that the demand for shares and bonds is not strongly affected by the issue of home ownership, as shares and bonds do not provide a good housing property hedge.

In spite of the research evidence, there are several empirical weaknesses with the housing diversification benefits argument.

First, the severe measurement problems of housing values. Thus, the results obtained might actually be an artifact of the house price index used rather than a true feature of the housing market. Second, the heterogeneity of the procedures to calculate the housing returns. Some of the reviewed studies rely on appreciation returns as a proxy for total returns and others use total returns. In addition, the income component of the latter could be based either on a residential rent index or constant rent-to-value ratio. Therefore, one must be careful to collate findings based on heterogeneous housing returns.

Third, the results are limited by the use of *ex post* returns instead of *ex ante* returns. The previous studies assume that historic data are a good estimation of future values on returns, variances and correlations. Sharpe (1990) however, suggests that financial historical data appears to be useful for predicting future variances, reasonably useful for forecasting correlations and virtually useless for estimation of expected returns. Furthermore, MacGregor and Nanthakumaran (1992) report that the correlation of property returns with those of financial assets is not stable over time. The authors argue that the correlation is dependent on the economic fundamentals registered during the time period analysed.

Fourth, the former empirical analysis was based on short-term transaction period returns (that is, annual or quarterly holding periods). Recent research has indicated that over long intervals there is a positive relationship between share returns and commercial property price changes (Quan and Titman, 1999). Additionally, Geltner and Miller (2001) suggest that when asset returns are correlated across time, the optimal long-term portfolio could differ from the optimal short-term portfolio.

Fifth, the traditional minimum variance optimisers ignore the special features that characterize some types of assets like property (illiquidity, marketability costs, and measurement issues).

The statistical measure of risk, standard deviation, does not capture the illiquidity of direct property, and thus standard optimisers tend to over weigh the portfolio allocation into property. However, it is possible to account for these liquidity risk, by subtracting illiquidity premiums from the average return on property. For instance, MacGregor and Nanthakumaran (1992) use a quarterly illiquidity premium of 50 basis points for UK property and Hoesli and Hamelink (1997) use illiquidity premiums of 50, 100 and 150 basis points for Swiss residential property. The illiquidity issue appears to be more important in the commercial market than in the housing market, since the latter, as mentioned before, exhibits a greater number of participants and transactions.

The traditional MPT ignores the marketability costs (Ibbotson and Siegel, 1984). The marketability costs are related to the buying and selling process and comprise information, transaction, and divisibility costs.

The information costs are, those related with the asset valuation process. The unsecuritized property market, contrarily to the security markets, is characterized by the absence of a transparent marketplace where it is easy to learn about expected asset returns. Thus, the direct property should have higher before-cost expected returns than assets that are easier to learn about (e.g. shares and bonds) (Ibbotson and Siegel, 1984). The same authors also state that these type of costs tend to benefit the larger investments, due to economies of scale.

The transaction costs (including the legal costs associated with the transaction, costs of advertising, costs of brokers used to effect the transaction) in buying and selling property are much greater than those in securities market. The transaction costs could remove part of the potential residential investment profit from establishing trading rules that consistently yield above-normal returns (Cho, 1996). Even so, the transaction costs could be relieved by holding the property assets during longer periods of time (Geltner and Miller, 2001). The transaction costs are extremely important for investment strategies that require frequent trading, but less critical for the long-term asset allocation decisions that are those usually faced by the institutional investors.

Divisibility costs emerge from the large size of some investments, such as property (Ibbotson and Siegel, 1984). The indivisibility could cause some investors to hold a non-optimal quantity of a particular investment. For instance, the smaller investors may have difficulties in eliminating the systematic risk of property portfolios (Hoesli and Macgregor, 2000) and, consequently, the portfolio theory methodology must be applied to large portfolios only.

The mentioned special features that characterize the property assets comprise some of the explanations like why the standard MPT optimisers tend to over weigh the portfolio allocation into property. Despite the fact that these characteristics have an effective influence on the "true" risk and return of property assets, they are not incorporated in the traditional mean-variance approach.

Finally, Portfolio Theory assumes that investors derive utility from consumption, which in turn is supported by financial wealth. The utility function takes a standard form in which relative risk aversion is constant. In contrast, the behavioural finance followers postulate that some investors have non-standard preferences. In a similar vein, the prospect theory of Kehneman and Tversky (1979) models a utility function that has a kink at the reference point and different patterns of curvature above and below the point.

The prospect theory has been applied to housing price cycles with some interesting results. For instance, Genesove and Mayer (2001) and Engelhardt (2001) suggest that nominal loss aversion – whereby house owners are particularly reluctant to realising nominal price losses – is an important explanation (along with housing equity constraints) for some housing market puzzles, like the strong positive price-volume correlation observed over the housing cycle and the negative correlation between house prices and time on the market. Given the nominal loss aversion effect, one can hypothesize that, during downward income cycles, the potential house purchasers may prefer renting to buying houses at inflated prices. Such comportment would have a positive effect over the demand in the rented housing sector during the downward income cycles. These are times in which the investors in the private rented housing would especially like their investments not to perform poorly. Additionally, Bernardes and Montezuma (2002) consider the (indirect) effects that loss aversion in consumption decisions might have on the housing market via demand behaviour. They argue that house prices will be much more responsive to negative changes in income than to positive changes, even at the start of the price cycle.

Others cite behaviour theory, include mental accounting, too much emphasis on recent experience, overconfidence, amongst others. Behaviour finance appears to be a promising research area with the potential to explain some types of investor behaviour and possibly some patterns in asset pricing (Campbell and Viceira (2002)).

One can identify several possible directions for future research. The first involves a consideration of the allocation factors that are not taken into account in the simplistic modern portfolio theory framework, namely, the liability matching issue in the institutional investment strategies and the special housing attributes (e.g. illiquidity, indivisibility, political risk). One can speculate that the former factor may have a positive impact on the proportion of institutional funds to residential property, since the housing returns usually track household growth and incomes.

The inclusion of foreign-based equities as an institutional eligible asset could also be a novel addition in relation to reviewed research. One can expect the inclusion of

foreign equities to have a negative impact on the residential allocation, as a result of the typically lower correlations between returns on foreign and those on national shares.

An additional direction involves the utilization of a multifactor asset pricing model in order to produce forward-looking instead of historical-based risk and return estimates (that is, *ex post* risk and returns). Given the cyclical behaviour of residential property, the forward-based approach to estimate both risk and returns on housing may well be advantageous for the analysis of residential property as an investment.

Developments in the study of the risk-return characteristics of housing property and its role in a mixed-asset portfolio may also include the utilisation of residential data pooled across countries, instead of data from a single country. Other research extensions on this topic include the use of multi-asset time series over longer holding periods (like five years) and the use of lags in time-series regressions.

Theoretical arguments for the property's diversification characteristics

Different theoretical explanations are presented for the empirical results on the correlations between property and financial assets. When the property returns are affected essentially by the same economic factors (or systematic influences) that affect the financial assets, property diversification benefits to multi-asset portfolios will be minimal. In other words, when common economic factors strongly affect returns on both property and financial asset classes, diversification across property may not be cost justified. On the contrary, if the property returns also respond to property-specific factors (non-systematic influences), diversification will be beneficial.

For instance, Quan and Titman (1999) hypothesize that positive correlations between long-term share returns and those of commercial property are related to the fact that commercial property and shares are both driven either, by changing expectations (rational or irrational) of future economic growth or, by current economic fundamentals.

Conversely, MacGregor and Nanthakumaran (1992) hypothesize that the low correlations between property and financial assets are, to some extent, a result of the property-specific factors rather than an artifact of the data. The authors' argument is that the property market supply responses to unexpected changes in the economic fundamentals are slow. The production of new property is slow, not only because the planning and building process is time-consuming, but also because the development decision process itself is slow, i.e. the developers, in order to minimise their investments risk, wait until the demand' and prices' increase is completely clear. The short-term supply rigidity associated with a deficient demand forecast cause an oversupply of property when demand is beginning to fall.

One can speculate that there are residential property-specific features able to reduce the correlation between residential property returns and those of financial assets. For example, foreign competition may lead to decreases in domestic wage rates, which in turn leads to increased corporate profits and higher share prices. However, if households' income decreases, the housing demand will also decrease, and the residential property values will fall. Changes in transport and communication network features could also induce a negative relation between property and share values. For instance, a more efficient transport and communication network may lead to increases in corporate productivity and higher share prices, which in turn cause land rents to decline and, consequently, decrease land values.

From the empirical studies reviewed and the theoretical arguments offered, one cannot reject, at least in the short-term, the hypothesized ability of housing to generate improved risk-adjusted returns when added to share and bond portfolios.

Conclusions

The risk-return characteristics of the housing asset is highly dependent on the type of perspective under analysis and therefore, the two housing investment approaches could lead to different conclusions about the role of housing investment in a portfolio context. The household's demand for housing, which could be optimal from the point of view of the consumption of housing services, may differ from the optimal level of housing allocation in a purely portfolio investment context, the consumption demand for housing together with the market imperfections places a constraint on the household's portfolio problem.

The empirical studies generally indicate that housing returns are weakly correlated with those of financial assets (mortgages, short- and long-term government bonds, and shares). They also suggest that housing is able to diversify a multi-asset portfolio and that the proportion of housing allocations increases with the risk aversion of the investor. However, the optimal amount of housing varies across the studies.

There is some theoretical and empirical evidences that the household's optimal portfolio is constrained by the ratio of housing investment to net worth, and this ratio tends to be related to age. The households tend to hold different portfolios of financial assets over their life-cycle. For example, a young household compared with a mature household tends to hold an optimal portfolio with lower allocation on shares.

Because the housing returns tend to exhibit positive autocorrelation and the transaction costs are high, the optimal household's portfolio is dependent upon the holding period (Englund *et al.*, 2000). For instance, for short-holding periods, housing allocation in an optimal portfolio is nearly zero. On the other hand, for longer periods, low risk portfolios contain 15 to 50 percent on housing. Additionally, the transaction costs decrease the frequency of housing adjustment and restrict investors' ability to take advantage of serial correlation in house prices. Finally, labour income and interest rate risk seem to crowd out housing investment (Cocco, 2000).

Notes

1. The residential submarkets are based on Memphis City Planning Commission "planning districts". Planning districts were drawn to preserve the architectural integrity and to incorporate natural and manmade boundaries.
2. The author uses estimated return series provided by Case and Shiller (1987).
3. On the PSID, the housing prices result from the owners' own assessments of house values.

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