

Housing, equities, risk, and portfolio management from a U.K. perspective¹

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Despite the current problems in the residential property markets and their implications for individuals, financial institutions, and markets, there are two important long term factors that are likely to make residential property retain its attractiveness in the long run:

- The last decade has witnessed a strengthening of the relationship between retail housing markets and financial institutions and markets, notably with the proliferation of REITs, credit derivatives based on residential property, and retail housing derivatives traded in Chicago. There has been an increased interest from financial institutions and markets in retail housing and this trend is likely to continue, especially as regulatory pressures increase in other markets.
- The problems associated with pension provisions for the baby boomer generation are also likely to have a positive impact on the level of interest in retail housing for developed economies. There will be an increasing relationship between the adequacy of pension provisions and the level of owner-occupation in a particular country (previously described in this Journal as the Smullen-MacDonald² conjecture). This would appear to suggest that the increasing anticipated problems with pension provisions will make individuals in most developed countries more interested in the retail housing market.

This article will attempt to consider some of the issues in relation to risk and return in housing and equity markets and how the resulting portfolio choices may have certain attractive properties for investors. We expect that private individuals and institutional investors will, in the future, have payoff structures related to the returns on retail housing and equities, and thus should be interested in the portfolio impacts of diversification among these asset classes.

Before we move on to the data and results of the analysis, there are several issues that require clarification.

Issue 1 – definition of timing

One of the major problems in making judgments about the evaluation of returns and risk from assets is the question of what is the appropriate time period for the investment and its evaluation. There is an important distinction between holding periods and evaluation periods in considering investments. The holding period would be the period over which an asset is expected to be held by an individual investor. It may be intra-day in the case of trading or trans-generational in the case of German residential housing, or any period in between. The evaluation period is defined as the time period that is used for investment decision making. There is no reason for believing that the evaluation time period is the same as the holding period. Prospect theory⁴ has been used to develop the view that the equity premium problem can be solved by assuming

an evaluation period of one year⁵. This is thus the time period that we will focus on in this article. That this issue may have important consequences can be seen from the data provided in Figures 1 and 2. We can see that the longer the holding or evaluation period relating to a particular asset, the lower the risk and the lower the differences in risk between different categories of assets. If the evaluation period is, for example, one year, the standard deviation of returns on assets is much higher for equities than bonds or bills (Figure 1). However, if the time period is ten years, there are much lower differences between the standard deviations of the different asset classes. If one considers risks in terms of adverse outcomes then one can observe the same picture, when the evaluation period is ten years the higher risks of bad outcomes in relation to equities disappear.

The time period of evaluation is, therefore, an important consideration for any investment since it may greatly influence the choices made in terms of different risky investments. The data considered in Figures 1 and 2 are examples of the standard statistical result known as the “central limit theorem.” It does, however, raise a number of further important issues.

Issue 2 – measurement of risk

The development of finance has seen an evolution in the measurement of risk. Initially, portfolio theory measured risk in terms of the standard deviation of returns. It focused on the idea that the correlation between the returns of assets could have a beneficial impact on portfolio risk. The lower the correlation, the greater would be the benefits from a risk mitigation perspective. The 1990s saw the development of downside-based risk measures, most notably value-

Asset	Average return	Standard deviation of return	High	Low
Equities	11.9	21.8	145.6	-48.8
Bonds	6.1	12.5	53.1	-19.1
Bills	5.1	3.9	17.2	0.5

Source: Dimson et al. (2002)³

Figure 1 - One year U.K. nominal returns per annum - 1900-2000

Asset	Average return	Standard deviation of return	High	Low
Equities	11.9	5.98	22.3	2.9
Bonds	6.1	4.69	14.4	-0.3
Bills	5.1	3.40	11.7	0.8

Source: Dimson et al. (2002)

Figure 2 - Ten year U.K. nominal returns on per annum basis - 1900-2000

1 We would like to thank a number of individuals who have helped us in the writing of this paper - Dr. Cesario Mateus, Liz Warren, Nick Hand, Dr. Alex Stojanovic, Dr. Lesley Catchpolwle, Jannie Thompson, David Meckin, and John Haynes.

2 Smullen, J., and K. MacDonald, 2007, “European residential property convergence,” *Journal of Financial Transformation*, 19, 29-33

3 Dimson, E., P. Marsh, and M. Staunton, 2002, *Triumph of the optimists: 101 years of global investment returns*, Princeton University Press

4 Khaneman D., and A. Tversky, 1979, “Prospect theory: an analysis of decision under risk,” *Econometrica*, 47:2, 263 - 291

5 Benartzi S., and R. Thaler, 1995, “Myopic loss-aversion and the equity premium puzzle,” *Quarterly Journal of Economics*, 110:1, 73-92

at-risk (VaR). These measures were consistent with the view of decision making postulated by Kahneman and Tversky (1979), which suggested that risk takers are inherently strongly loss averse.

In the calculations which follow, we contrast the traditional portfolio theory measure of risk, namely the standard deviation of returns, with a range of downside risk measures, such as semi-standard deviation of returns, average return in losses, and the proportion of loss-making time periods. These downside risk measures all have the virtue of being measured with reference to zero return and thus focus on the measurement of different aspects of loss. Losses are considered the key determinant of investor utility within prospect theory. They can also be seen to correspond to the more widely used expected tail loss, which is identical to the average return in losses if a zero return is defined as the cut-off value for the calculation. The proportion of loss-making periods can also give information akin to value-at-risk since it is the cut-off percentage which makes the absolute value-at-risk zero.

The measures calculated will focus on the diversification implications of portfolio formation and the impact of changing evaluation periods on investment. In essence, all the measures of risk experience a degree of portfolio diversification and risk reduction as the time period under consideration increases.

Issue 3 – impact of diversification

The use of residential housing assets and obligations will be attractive in portfolio formulation for a number of reasons, predominantly because housing markets behave differently from financial markets. In particular, the housing market is not efficient in the traditional sense and its returns have different timings from those of other asset markets. In standard financial asset markets when the market is under pressure prices fall on increased volumes. This is not the case in retail housing markets, where prices are sticky in a downwards direction and the number of transactions contract. The transaction costs and the time taken to undertake transactions will always make the time profiles of returns different from those of financial markets.

The increasing interest by financial markets and institutions in different aspects of the retail housing markets may, however, lead to increasing correlations of returns between the different markets. We have undoubtedly seen this in the recent impacts of the 'credit crunch.' The risk reduction benefits are likely to fall in the future, however, due to the structurally different nature of the markets there will continue to be benefits from diversification.

Data

We now move on to the core data used for our analysis. The data used in this study comes from the FT100 Index and the three different house price indices used in the U.K., the local govern-

ment, Halifax, and Nationwide. The FT100 data is not adjusted for dividends and therefore does not represent the total returns on the assets. We have focused on the relationship between the FT100 Index and the Nationwide Index. The Nationwide Index has been selected because during the period under consideration, Q1-1984 to Q2-2004, it was the index that experienced the greatest number of negative observations and appears to be the most sensitive in its measurement of house price falls. These attributes are essential for our understanding and measurement of risks.

The time period covered includes a full cycle of stock market returns, with both booms and busts, and two cycles in the housing market. Consequently, the data is representative of most market conditions. It is a period during which the housing market witnessed a number of changes, including an expanding private rental sector, but excludes the implications of the recent credit crunch. These factors will, in our view, enhance the relative attractiveness of retail housing investment in our period and understate the correlation between returns in the housing and equity markets. However, the overall conclusions based on our data will, in our opinion, still hold good.

Figure 3 provides a summary of FT100 and house price index data. It is interesting to note that the average returns over the time period under consideration are higher for house prices than equities (dividends and rental incomes are excluded). During this period the level of rents is likely to have been greater than dividends, which means that the returns on housing should be even greater, relative to the returns on equity, than that presented in the Figure. This apparent anomaly is partly explained by the restrictions on rental property in the U.K. during this time period, and the adjustments when the restrictions were removed.

We have considered data which is quarterly or annual. Given that the overwhelming bulk of housing sales take over three months to complete, this is the minimum sensible trading period for which houses should be considered in terms of feasible investment returns. The juxtaposition with annual data is based on the argument that there is some evidence that shares are evaluated on an annual basis [Benartzi and Thaler (1995)]. The results and com-

Measure	Average return	Standard deviation of returns	High	Low
U.K. government - housing	8.96	9.14	32.90	-5.70
Halifax - housing	8.24	9.69	34.00	-8.30
Nationwide - housing	8.29	9.62	32.00	-10.70
FT100 - equity capital gain	7.69	34.73	72.32	-109.40*

* Negative returns of over 100% produced for the base data is the three month return, which is -27.35% in Q4-1987, annualized to make comparable with the time period of other data.

Figure 3 - Annualized returns based on three month data, Q1-1986 to Q2-2004

6 Case, K., and R. Shiller, 1989, "The efficiency of the market for single-family homes," American Economic Review, 79:1, 125 -137

	U.K. government	Halifax	Nationwide	FT100
U.K. government	1.00			
Halifax	0.93	1.00		
Nationwide	0.91	0.93	1.00	
FT100	-0.05	-0.04	-0.03	1.00

Figure 4 - Annualized three month return correlation matrix (Q1-1986 to Q2-2004)

comparisons between three month and one year periods indicate the impacts to be expected from data for longer periods.

The data used in all the Figures is annualized so that magnitudes are easier to compare. Figure 4 presents the correlation coefficients of the different series. It is clear that the house price indices are highly correlated with each other, as one would expect, but have a relatively low correlation with the FT100, which indicates that from a traditional portfolio perspective the gains from diversification should be relatively large.

Results

In this section we analyze the implications of combining different proportions of equities and property indices within the same portfolio (Figures 5 and 6). The first column in Figures 5 and 6 considers the portfolio composition. If, for example, it is 25/75 it represents a portfolio where 25% of the investment is in the FT100 and 75% is in residential property whose returns follow the Nationwide Index. The next column represents the expected return on the portfolio. The third column represents the portfolio risk measured for the different types of risk when there are no risk reduction impacts. The all in FT and all in Nationwide risk measures are calculated from their indices and the other entries in the third column are the weighted averages of these two calculations. The fourth column gives the actual risk measure from the portfolio.

The fifth column measures the magnitude of risk reduction and is the figure in column three minus the figure in column four. The final column measures the level of risk reduction as a percentage of the weighted average risk measures. It is the value in column five divided by the value in column three but expressed as a percentage.

The results provided in Figure 5 are calculated on data which is quarterly and multiplied by a factor of four to produce annualized data, so that it can be compared with the results in Figure 6, which uses annual data.

The data indicated that the longer the period under consideration the lower the risks and narrower the range of risks created by the different portfolios. The levels of risk reduction from portfolio generation appear to be greater in the case of the downside risk measures for the longer time period of one year, as opposed to three months. The risk reduction in the three month data was greater for

Standard deviation					
	E(R)	SD(R)WA	SD(R)	RR	RR%
0/100	8.29	9.62	9.62	0	0
25/75	8.13	15.9	11.12	4.78	30.04
50/50	7.98	22.18	17.88	4.3	19.37
75/25	7.82	28.45	26.09	2.37	8.32
100/0	7.66	34.73	34.73	0	0
Average downside return					
	E(R)	AD(R)WA	AD(R)	RR	RR%
0/100	8.29	4.46	4.46	0	0
25/75	8.13	10.58	6.92	3.66	34.59
50/50	7.98	16.7	16.15	0.55	3.29
75/25	7.82	22.81	20.14	1.67	7.32
100/0	7.66	28.93	28.93	0	0
Standard deviation of downside returns					
	E(R)	SD(R)WA	SD(R)	RR	RR%
0/100	8.29	2.55	2.55	0	0
25/75	8.13	7.67	4.11	3.56	46.41
50/50	7.98	12.8	9.82	2.98	23.28
75/25	7.82	17.52	19.81	-2.29	-13.71
100/0	7.66	23.04	23.04	0	0
Proportion of downside instances					
	E(R)	DP(R)WA	DP(R)	RR	RR%
0/100	8.29	23	23	0	0
25/75	8.13	25.75	20	5.75	22.33
50/50	7.98	28.5	23	5.5	19.3
75/25	7.82	31.25	49	-17.75	-56.8
100/0	7.66	34	34	0	0

Figure 5 - Portfolio risk measures quarterly data annualized (Q1 - 1986 to Q2 - 2004)

portfolios that concentrated on housing. For the annual data the greatest risk reduction was for equally balanced portfolios. In the case of downside risk measures the portfolio impacts were not in all cases beneficial, since the 75% equity portfolio led to increased levels of risk, as measured by the standard deviation of downside returns, as a result of portfolio formation.

The highest average returns were always for the portfolios which were 100% invested in housing. In considering the quarterly data the least risk was in the housing portfolio with all the measures, with the exception of the proportion of downside instances where the portfolio invested 25% in equities and 75% in housing. This portfolio had the lowest levels of risk. When considering the annual data the picture was different, since the 25% equities and 75% housing had the lowest levels of risk for all measures with the exception of the average downside returns measure.

Standard deviation of returns					
	E(R)	SD(R)WA	SD(R)	RR	RR%
0/100	8.29	9.33	9.33	0.00	0.00
25/75	8.13	10.96	7.83	3.13	28.56
50/50	7.98	12.59	8.95	3.64	29.38
75/25	7.82	14.21	11.90	2.31	16.26
100/0	7.66	15.84	15.84	0.00	0.00

Average downside returns					
	E(R)	AD(R)WA	AD(R)	RR	RR%
0/100	8.29	3.48	3.48	0.00	0.00
25/75	8.13	6.26	4.62	1.65	26.36
50/50	7.98	9.03	4.58	4.45	49.28
75/25	7.82	11.81	8.91	2.90	24.57
100/0	7.66	14.59	14.59	0.00	0.00

Standard deviation of downside returns					
	E(R)	SD(R)AW	SD(R)	RR	RR%
0/100	8.29	1.81	1.81	0.00	0.00
25/75	8.13	2.16	0.72	1.44	55.17
50/50	7.98	2.51	1.27	1.24	49.40
75/25	7.82	2.86	1.82	1.82	36.36
100/0	7.66	3.21	3.21	0.00	0.00

Proportion of downside instances					
	E(R)	DP(R)WA	DP(R)	RR	RR%
0/100	8.29	27.78	27.78	0.00	0.00
25/75	8.13	27.78	11.10	16.68	60.04
50/50	7.98	27.78	22.21	5.57	20.05
75/25	7.82	27.78	27.78	0.00	0.00
100/0	7.66	27.78	27.78	0.00	0.00

Figure 6 - Portfolio risk measures annual data (Q1 - 1986 to Q2 2004)

Conclusion

In this and our previous papers in this journal we have considered the factors which determine the long term attractiveness of residential property as an investment. We highlight the possible benefits in relation to returns and risk reduction, which can be obtained from portfolios of financial obligations whose value depends on the price of residential housing. We have considered this from the perspective of the time period of investment problem and the portfolio impacts of diversification. These arguments are seen to be part of the reasons for the attractiveness of the long term future of the retail housing market. It also provides some insight as to why private individuals will continue to find investment in retail housing a sensible substitute for pension provision.

