5. The Long-Term Returns to Durable Assets

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Although a substantial amount of durable assets is included in many households' investment portfolios, these assets are hard to measure. As a result, it is difficult to form return expectations based on a theoretical framework. This chapter examines what the investment performance of durable assets has been in the past to help make predictions about their future returns. It also shows how durable assets can help with diversification (but not inflation hedging) in investors' portfolios.

Introduction

Long-lasting non-financial assets—durable assets—feature prominently in households' investment portfolios. For many households, real estate is the most important component of their portfolio. Even high-net-worth individuals have more wealth invested in real estate (other than their primary residence) than in fixed income and only slightly less invested in real estate than in equities (Capgemini and RBC Wealth Management 2015). Moreover, such households typically have a substantial proportion of their wealth—almost 10%, on average, according to a survey done by Barclays (2012)—locked up in luxury collectibles (such as art and wine), precious metals, and diamonds. Likewise, endowments and other long-term institutional investors are increasingly looking to non-financial assets to diversify their portfolios and protect against inflation (e.g., Dhar and Goetzmann 2006).

Despite their economic importance, it can be challenging for academics and investment professionals to form expectations of the financial returns on durable assets. The risk exposures are hard to estimate, and a whole range of costs and benefits of "carry" may affect equilibrium expected returns. For example, both houses and artworks are indivisible (leading to investor underdiversification) and illiquid, and they are costly to maintain, store, and insure. Moreover, some of these assets also provide their owners with a non-financial utility dividend that can be hard to measure. Given the difficulty of forming return expectations based on a theoretical framework, it is useful to turn to history and examine what the investment performance of durable assets has been in the past. In financial asset markets, long-term historical returns are often used as a first proxy for expected returns going forward—even

if expected returns are time varying and differ from the historical average (Ilmanen 2011).

In this chapter, I summarize the existing knowledge on the long-term price appreciation of three categories of durable assets: (1) housing and land; (2) collectibles; and (3) gold, silver, and diamonds. Where price indices are not available, I complement the literature with new data and analysis. Although this study focuses on capital gains, I comment on income yields where relevant. By considering more than a century of returns for each asset, I mitigate the worry that my findings are driven by fads or fashions. Finally, I also analyze the diversification and inflation-hedging properties of durable assets.

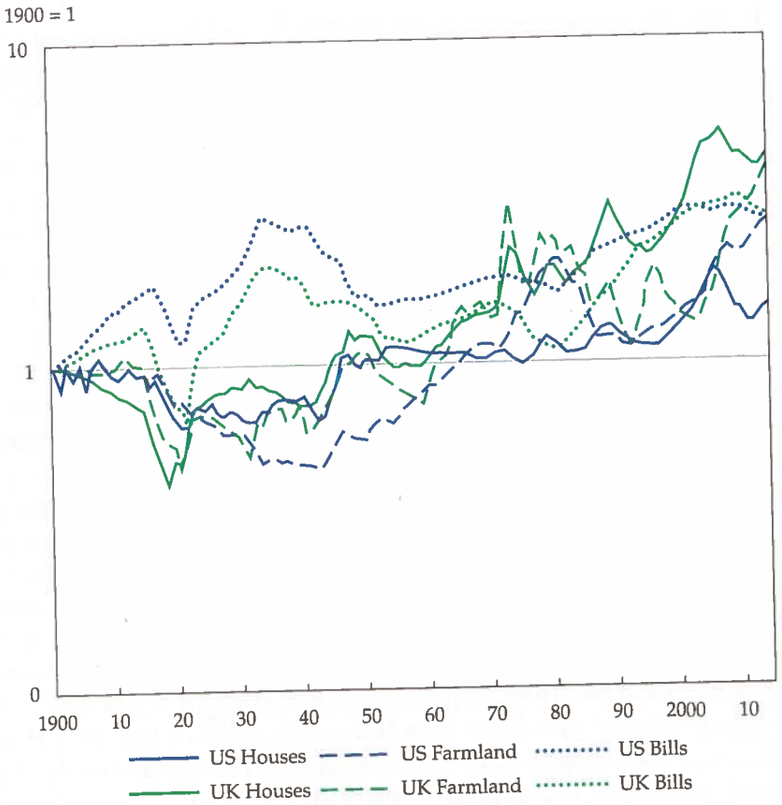
Housing and Land

Figure 5.1 presents long-term real (i.e., inflation-adjusted) price indices for US and UK real estate and land for the period 1900–2014. For the United States, I used a real home price index from Shiller (2015a, 2015b). (For the years since 1953, for which monthly data are available, I used the average of the June and July index values.) To create a land index starting in 1910, I adjusted average farmland values per acre (from Clifton and Crowley 1973; US Department of Agriculture 2015) for inflation using data from Dimson, Marsh, and Staunton (2002, 2015). In Figure 5.1, I set the starting value of this index equal to the value of the US home price index in 1910. For the United Kingdom, I used a real housing price index from Monnery (2011) chain-linked to four yearly average inflation-adjusted price levels from Nationwide (2015). I also constructed a real farmland value index based on trends in price per acre shared by the Rural Research team of the real estate service provider Savills. Figure 5.1 also compares the capital gains on housing and land to the investment performance of government bills since the beginning of 1900 for the two countries (Dimson, Marsh, and Staunton 2002, 2015).

Table 5.1 summarizes the real return distribution information, adding total equity and bond returns to the comparison. Both here and for the other durable assets in this chapter, the standard deviation (S.D.) may be underestimating the true volatility because the price indices typically aggregate information over 12-month periods (and because some indices use appraisal values, which are known to be "stickier" than transaction prices). For some assets, returns are computed as the average price appreciation *between* two calendar years (e.g., between 1999 and 2000) rather than *over* a calendar year (e.g., between the start and the end of 2000).

What can we learn from the data presented in Figure 5.1 and Table 5.1? It is clear that the long-term appreciation rates of housing and land have been

Figure 5.1. Housing and Land: Long-Term Price Indices 1900–2014 (in real USD and GBP)



low; they are more or less comparable to the historical returns on government bills. In the first decades of the 20th century, housing and land even lost value in real terms. Between the 1940s and the 1990s, housing prices in the United States barely moved in real terms—despite substantial economic and demographic growth over this period—before showing a boom and bust that is exceptional by historical standards.

UK housing prices have appreciated somewhat more steadily since the end of World War II, but also during this period the price increases were interrupted by substantial setbacks. Turning to farmland values, we see that a temporary bubble occurred in the late 1970s, and recently prices have increased substantially.

Table 5.1. Housing and Land: Return Distributions 1900–2014 (in real USD and GBP)

	Mean Returns		Dispersion of Annual Returns				
	Geometric	Arithmetic	S.D.	Lowest	Year(s)	Highest	Year(s)
US houses	0.3%	0.5%	6.2%	−14.3%	1904–05	21.4%	1945–46
US farmland	0.9%	1.2%	5.5%	−14.4%	1984–85	16.4%	2004–05
US equities	6.5%	8.5%	20.1%	−37.6%	1931	56.3%	1933
US bonds	2.0%	2.5%	10.5%	−18.4%	1917	35.1%	1982
US bills	0.9%	1.0%	4.6%	−15.1%	1946	20.0%	1921
UK houses	1.3%	1.6%	7.7%	−14.8%	1914–15	27.7%	1921–22
UK farmland	1.2%	1.9%	12.6%	−34.5%	1973–74	67.3%	1971–72
UK equities	5.3%	7.1%	19.7%	−57.1%	1974	96.7%	1975
UK bonds	1.6%	2.4%	13.7%	−30.7%	1974	59.4%	1921
UK bills	0.9%	1.1%	6.3%	−15.7%	1915	43.0%	1921

Notes: For US farmland, the return data series starts in 1910 instead of 1900. Only capital gains are considered for houses and farmland.

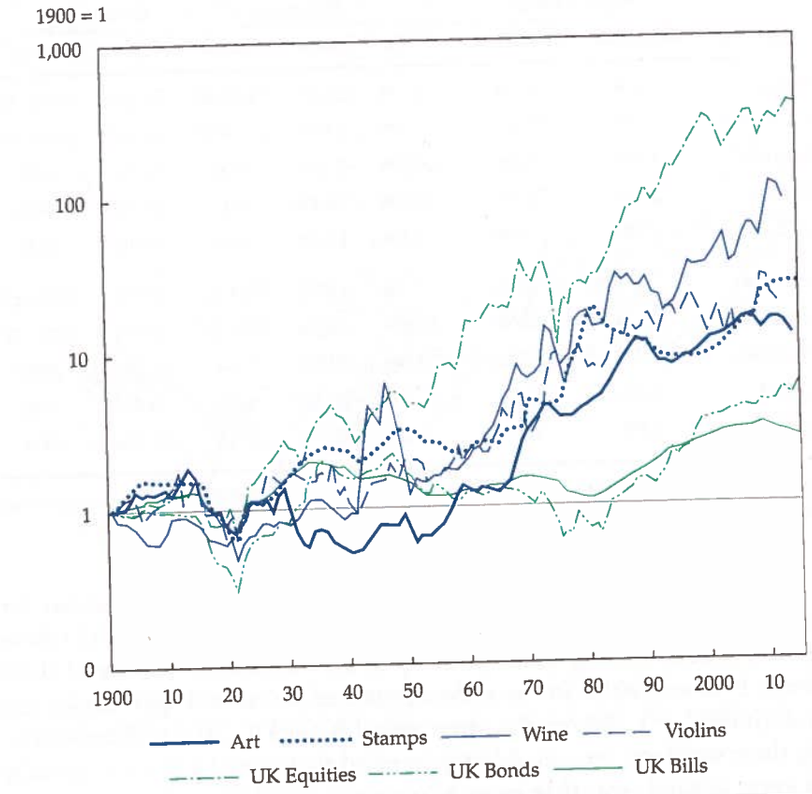
The low capital gains on real estate have also been documented for other countries. For example, data collected by Eichholtz (1997, 2015) show that Amsterdam housing prices went up at an annualized real rate of 0.7% between 1900 and 2010. In Paris, the annualized rate of real appreciation has been estimated at 1.2% over the same period (CGEDD 2015). When evaluating these numbers, one should keep in mind that capital gains are typically even lower in rural areas than in such "superstar cities" (Gyourko, Mayer, and Sinai 2013).

It is important to highlight that this analysis only focuses on capital gains and ignores income yields. Housing rental income yields vary over time and in the cross-section—with higher relative prices typically being associated with lower yields—but can be substantial. Taking into account maintenance costs and other expenses, Weeken (2004) mentions an average net rental yield for UK residential properties of about 5% between 1967 and 2003. For UK farmland, high recent price growth seems to have brought down income yields to less than 2% (Savills 2015).

Collectibles

Figure 5.2 shows indices beginning in 1900 in real British pounds for four different types of collectibles. For art, the starting point is the long-term price index of Goetzmann, Renneboog, and Spaenjers (2011), which is largely based

Figure 5.2. Collectibles: Long-Term Price Indices 1900–2014 (in real GBP)



on London auction sales. I chain-linked this index to returns based on the mid-year values of the UK art market index, as calculated by Artprice.com (2015), to get a series that runs until 2014. For stamps, I chain-linked the index of Dimson and Spaenjers (2011), based on British stamp price catalogues from the dealer Stanley Gibbons, to the returns on Stanley Gibbons GB250 Stamp Index for the most recent year-ends. For wine, I used the index of Dimson, Rousseau, and Spaenjers (2015), which focuses on first-growth Bordeaux and is based on London price information from dealer Berry Bros. & Rudd and auction house Christie's. This index stops at the end of 2012. For violins, I converted the index constructed by Graddy and Margolis (2011, 2013), which uses a variety of sources but is largely based on sales by London-based dealer W.E. Hill & Sons, to real British pounds. This last price index also ends in 2012. Figure 5.2 also compares the long-term returns of the different collectibles to

those of UK financial assets over the complete 1900–2014 period, again borrowing data from Dimson, Marsh, and Staunton (2002, 2015).

Table 5.2 shows statistics on the different return distributions.

We can draw a number of conclusions from the indices and data shown in Figure 5.2 and Table 5.2. First, the different collectible types have remarkably similar long-term returns. Art, stamps, wine, and violins outperformed government bonds but underperformed equities. Wine stands out somewhat, but Dimson, Rousseau, and Spaenjers (2015) note that the highest returns are observed on young high-quality wines that are still maturing. On older wines, which are more likely to be bought as collectibles, the returns are closer to those on art, stamps, and violins. Second, all collectibles have realized most of their increase in value over the last half century. Real appreciation was limited over the first six decades of the 20th century. Third, short-term returns can nevertheless differ substantially between different collectibles; the correlations between the return series are all below 0.22. Relatively high returns for a collectible category are typically followed by underperformance relative to other collectibles, suggesting some return predictability (Dimson, Rousseau, and Spaenjers 2015). Fourth, and finally, the price volatility of collectibles is relatively high, especially when considering that the standard deviations reported here may still underestimate true volatilities because of the time aggregation of data and the use of appraisal values.

It is important to note that the price indices reflect the estimated performance prior to transaction costs. Round-trip transaction costs can easily exceed 25%, both in auction and in dealer markets. Furthermore, only the wine index takes into account expenses associated with storage and insurance.

Table 5.2. Collectibles: Return Distributions 1900–2014 (in real GBP)

	Mean Returns		Dispersion of Annual Returns				
	Geometric	Arithmetic	S.D.	Lowest	Year(s)	Highest	Year(s)
Art	2.2%	3.0%	12.3%	–29.7%	1914–15	38.4%	1967–68
Stamps	2.9%	3.5%	12.2%	–19.2%	1915	56.3%	1979
Wine	4.1%	6.7%	26.3%	–37.1%	1949	145.6%	1942
Violins	2.7%	5.7%	25.4%	–47.7%	1970–71	105.0%	2009–10
UK equities	5.3%	7.1%	19.7%	–57.1%	1974	96.7%	1975
UK bonds	1.6%	2.4%	13.7%	–30.7%	1974	59.4%	1921
UK bills	0.9%	1.1%	6.3%	–15.7%	1915	43.0%	1921

Note: For wine and violins, the return data series end in 2012 instead of 2014.

Illiquidity is another factor that may play an even bigger role here than for the other durable assets covered in this chapter. Finally, it is clear that investors may face a number of pitfalls that they do not encounter when dealing with financial assets. Dimson and Spaenjers (2014) review these different expenses and investment risks in more depth. Still, most collector-investors also receive a significant (but elusive) emotional "yield" from ownership.

Gold, Silver, and Diamonds

Finally, I consider the long-term historical returns to gold, silver, and diamonds. **Figure 5.3** shows indices in real US dollars. Annual average gold prices for the years 1900–2014 were taken from Officer and Williamson (2015). Something to keep in mind is that for most of the 20th century, the price of gold was fixed in nominal terms. The convertibility of US dollars to gold was only cancelled in 1971. Real gold price changes before the early 1970s were thus driven by inflation and deflation or changes in the official nominal price of gold. (Moreover, private ownership of gold was outlawed in the United States between 1933 and 1974.) Silver prices are computed by using annual average silver-to-gold price ratios from Officer and Williamson (2015).

For diamonds, I constructed a price index for the period 1900–2012. I used data from the Minerals Yearbooks (US Geological Survey 2015) on the average import value per carat for a cut diamond for the years since 1929. Next, I took data from Sutton (1979) on the rough diamond price per carat for the periods 1900–1913 and 1926–1929; the resulting price index can be chain-linked to the one based on import values in 1929. For the years 1919–1921, I relied on imputations using the Minerals Yearbooks data that are also available for those years (and the year-1929 price ratio of cut diamonds relative to rough diamonds). For the periods 1914–1918 and 1922–1925, I geometrically interpolated the index values. Figure 5.3 also compares the performance of gold, silver, and diamonds to that of US bills.

Table 5.3 shows the return distributions and compares to US equities and bonds as well.

What do Figure 5.3 and Table 5.3 teach us about the dynamics of these assets? The most striking observation is that gold, silver, and diamonds all combine a low long-term real return with a high volatility. (Since the end of 1974, when gold could be traded freely again, gold has been more volatile than equities.) All three assets appreciated rapidly in the second half of the 1970s and in a 10-year period starting in 2002. However, strong price rises are typically followed by negative returns.

Figure 5.3. Gold, Silver, and Diamonds: Long-Term Price Indices 1900–2014 (in real USD)

Table 5.3. Gold, Silver, and Diamonds: Return Distributions 1900–2014 (in real USD)

	Mean Returns		Dispersion of Annual Returns				
	Geometric	Arithmetic	S.D.	Lowest	Year(s)	Highest	Year(s)
Gold	0.7%	1.8%	16.2%	−33.2%	1980–81	75.8%	1979–80
Silver	0.1%	2.4%	22.7%	−54.6%	1980–81	88.4%	1978–79
Diamonds	0.0%	1.0%	13.9%	−33.3%	1946–47	42.4%	1941–42
US equities	6.5%	8.5%	20.1%	−37.6%	1931	56.3%	1933
US bonds	2.0%	2.5%	10.5%	−18.4%	1917	35.1%	1982
US bills	0.9%	1.0%	4.6%	−15.1%	1946	20.0%	1921

Note: For diamonds, the return data series ends in 2012 instead of 2014.

Diversification and Inflation Hedging

To better understand the potential diversification and inflation-hedging benefits of durable assets, I show how (real) durable asset returns have historically co-moved with (real) equity and bond returns and also with inflation. I estimated linear regression models that took into account the potential asynchrony in returns by including a lagged, a contemporaneous, and a leading independent variable (equity returns, bond returns, or inflation). I then aggregated the slope coefficients (Dimson 1979). For the durable asset series in GBP, I used UK financial market and inflation data; for the durable asset series in USD, I used US data. The results are shown in **Table 5.4**.

Table 5.4 shows positive but relatively small equity market betas for real estate and land. Consistent with the idea that demand for luxury assets is positively affected by wealth creation (Aït-Sahalia, Parker, and Yogo 2004), there is a relatively strong co-movement of art and wine with equities. Gold (for which I used return data since 1975) is the only asset that covaries negatively with equities. The bond market betas largely mirror the equity market sensitivities.

Deflated housing and land returns are negatively correlated with inflation (at least in the United Kingdom), and there is some evidence that real collectible returns are also negatively impacted by inflation. Interestingly, gold

Table 5.4. Estimates of Equity Market, Bond Market, and Inflation Betas

	Equities	Bonds	Inflation
US houses	0.15***	0.17*	−0.16
US farmland	0.06	−0.19**	0.10
UK houses	0.16**	0.27***	−0.44***
UK farmland	0.29**	0.41***	−0.50**
Art	0.52***	0.32**	−0.41*
Stamps	0.20*	0.26**	−0.22
Wine	0.54**	0.64**	−0.37
Violins	0.12	0.08	−0.15
Gold	−0.76*	−0.92*	1.55
Silver	−0.07	−0.28	0.56
Diamonds	0.14	0.00	0.14

Notes: For gold, I used return data starting in 1975. For the other assets, I used the longest possible series. All asset returns are in real GBP or USD.
*Significant at the 10 percent level.
**Significant at the 5 percent level.
***Significant at the 1 percent level.

and silver (and, to a lesser extent, diamonds) exhibit positive covariance with inflation. However, the regression coefficient is not statistically significant, and the very high short-term volatility in the real price of these assets makes them poor inflation hedges (Erb and Harvey 2013).

Conclusion

I have studied the returns to investments in durable assets since the start of the 20th century and have shown that these assets are generally characterized by relatively low capital gains and substantial price fluctuations. Collectibles have had higher rates of price appreciation, but transaction costs also are very high in such markets. However, rental income yield can add substantially to the returns on housing and land, whether the rental income is explicit or, as with owner-occupants, imputed. Likewise, owners of collectibles may receive a significant emotional dividend. Because of the lack of such an income or utility stream, gold, silver, and diamonds appear to have been particularly bad long-term investments (at least if not held in the form of jewelry). Finally, durable assets are unlikely to be good inflation hedges, but they may still help diversify a portfolio because of their imperfect correlations with financial assets.

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