

Ex post: The investment performance of collectible stamps

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This version: September 29, 2009

Abstract

This paper uses stamp catalogue prices to investigate the returns on British collectible postage stamps over the period 1900–2008. We find an annualized return on stamps of 6.7% in nominal terms, which is equivalent to 2.7% in real terms. These returns are higher than those on bonds but below those on equities. The volatility of stamp prices approaches that of equities. Stamp returns are impacted by movements in the equity market, but the systematic risk of stamps remains low. Estimates of average after-cost returns for individual investors show that stamps may rival equities in terms of realized performance.

JEL classification: D14, G1, N24, Z11.

Keywords: Alternative investments; Indexes; Long-term returns; Philately; Stamps.

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The authors would like to thank Rachel Campbell, David Chambers, Peter de Goeij, Michael Hall (Stanley Gibbons), Campbell Harvey, Benjamin Mandel, Kim Oosterlinck, Luc Renneboog, Stephen Satchell, and participants at the 2009 European Historical Economics Society Conference and a Princeton University workshop for valuable comments and suggestions. Spaenjers thanks the Netherlands Organisation for Scientific Research (NWO) for financial support, and London Business School for its hospitality.

1. Introduction

Belk (1995) describes collectors as individuals who passionately, and sometimes even obsessively, search and shop for unique but in essence useless items, such as obsolete postage stamps. Stamp collecting has been an established pastime almost since the introduction of the Penny Black, the world's first prepaid adhesive stamp which was issued in the United Kingdom in 1840 (Johnson, 1920). The first professional dealers started business in the 1850s. Not much later, stamps were also sold through different types of auctions: Lucking-Reiley (2000) presents evidence of the use of conventional English ascending-bid auctions and both first-price and second-price sealed-bid mail sales in the nineteenth century stamp market.

By the early twentieth century, international expositions were attracting philatelists from around the world, and collectible stamps could possess significant financial value. At the 1913 International Stamp Exhibition in New York, art dealer Henry J. Duveen's collection was valued at more than \$0.25 million (The New York Times, 1913), and by 1955 the world's most valuable stamp collection was worth an estimated \$2.5 million (Time, 1955). To put these valuations in context, if invested in US equities, \$0.25 million in 1913 would by start-2009 be worth \$1.4 billion (with dividends reinvested), while \$2.5 million in 1955 would be worth \$374 million. Moreover, the ever-high popularity of stamp collecting, the extensive global network of auction houses (now joined by online auction sites) and dealers (more than 600 in the UK alone), the existence of catalogues containing reference prices, and the ease of storage and transfer have ensured a relatively high liquidity of stamps throughout modern times.

According to Gelber (1992), the philatelic literature has long suggested that "deliberately making money from one's hobby was a perversion of the proper reason to collect". However, while pecuniary benefits may not always be the primary motive for acquiring collectibles such as stamps, Burton and Jacobsen (1999) show that many collectors also hope for financial gains. More than a century ago, journalist and stamp collector Edward Nankivell (1902) argued that "it is impossible to get away from the necessity of regarding stamps as an investment". Today, it is no longer taboo to think of stamps as an asset that may contribute to a diversified investment portfolio. Satchell and Auld (2009) draw the distinction between the demand driven by the intrinsic pleasures of ownership, and the demand for

stamps as an alternative financial asset. An individual with possibly the finest stamp collection in private hands is the chief investment officer of PIMCO, who has spent more than \$100 million on stamps from all over the world based on top-down philatelic valuation techniques, and who noted after the 2007 sale of his \$9 million collection of British rarities that the return had been “better than the stock market” (Gross, 2008).

There are tens of millions of stamp collectors worldwide, who annually spend up to \$10 billion on their hobby (Reuters, 2006). This figure amounts to more than the total value of fine art auction sales in the art market’s golden year, 2007 (Artprice.com, 2008). Many active philatelists specialize in vintage stamps from Great Britain. To serve these collectors’ need for a reliable price index, stamp dealer and catalogue publisher Stanley Gibbons launched the Stanley Gibbons Great Britain 30 Rarities (SG GB30) index in 2004. The SG GB30 aggregates the catalogue prices for 30 “scarce to rare” British stamps of high value. Price indexes are clearly a part of Stanley Gibbons’ marketing strategy. At the launch of another index, the SG100, the press release noted: “The index will objectively demonstrate the stable growth performance which the stamp market enjoys. It should encourage more investors to choose stamps as an alternative means of achieving the returns they have failed to obtain from traditional investment routes in recent years” (Stanley Gibbons, 2002). Stanley Gibbons has also often referred to the good performance of the SG GB30 on its website and in its publications. (Appendix A provides more background information on both the SG100 and the SG GB30.)

Three problems with the SG GB30 come to the fore. First, if the market for stamps even slightly resembles the art market, it is not improbable that, since its launch in 2004, the SG GB30 has been measuring returns in a boom market, and that the price appreciation over the longer term has been much more modest. Second, while most of the company’s publications focus on the performance of the SG GB30 since its creation, it has at times also back-tracked the values of the 30 stamps included in the index, and reported the annualized returns since the late 1990s (Gibbons Stamp Monthly, 2005) or even the 1970s (Gibbons Stamp Monthly, 2006a). Since the constituents of the index are those stamps with the highest values in 2004, the index suffers from a typical look-ahead bias (Dimson, Marsh, and Staunton, 2002). The back-tracked price evolution of the constituents of the SG GB30 may therefore not be representative of the overall price trend in the market for British collectible stamps.

Third, some of the constituents of the SG GB30 are rare plates or non-regular stamp types, which have a larger chance of being very thinly traded.

It is not the first time that a firm dealing in collectibles creates its own price index. Consider, for example, the Sotheby's Art Index, which was run in the 1980s by the famous auction house. The index values were based on the appraised values of works of art, as estimated by Sotheby's experts. Shiller (1993) argued that the index "must reflect a lot of guess work" and "would appear to have even greater potential problems than the appraisal-based indexes of commercial real estate". Nevertheless, with the impressive performance of the index in hand, Sotheby's could convince potential art buyers that the art market is full of lucrative investment opportunities (Lacey, 1998). Sotheby's discontinued their index very soon after the art market crash of 1991.

In this paper, we look into the returns on British collectible postage stamps over the very long term, based on Stanley Gibbons catalogue prices. We construct buy-and-hold portfolios of investment-quality stamps, and report returns on these portfolios since 1900. For the last few decades, we also compare our results to the returns reported by Stanley Gibbons itself. We then construct a periodically rebalanced stamp price index, report on the distribution of returns on stamps between 1900 and 2008, and compare these returns to those on a number of financial assets. We also investigate the relationship between stamp returns on the one hand and inflation and equity market movements in Great Britain on the other. Finally, we briefly look into the dispersion of returns across stamps and give rough estimates of the realized returns of individual investors in equities and stamps after transaction costs.

We find that the annualized nominal return on our earliest buy-and-hold portfolio is equal to 7.5% over the whole time frame. The returns on the different buy-and-hold portfolios are very similar to each other and, since the 1970s, also comparable to the returns reported by Stanley Gibbons for its SG GB30. Since 1900, our rebalanced stamp price index has shown an annualized nominal return of 6.7%, and an annualized real return of 2.7% – a performance that is lower than the return on equities, but higher than the return on government bonds. There have been remarkably higher returns in some boom periods, for example in the second half of the 1970s and during recent years. After unsmoothing the real stamp return series, we find that the volatility of these returns is much higher than that of bonds and only slightly below that of equities. The nominal returns on stamps show a relatively large

positive correlation with inflation, but the correlation between real stamp returns and inflation is still significantly negative. Once we account for non-synchronous trading, stamp returns are positively correlated with stock market movements. The beta of stamps is still relatively low, though, indicating that investors in stamps are only modestly exposed to systematic risk. Price trends are similar across collectible stamps, and the most precious stamps have not beaten other collectible stamps. Finally, taking account of differences in holding periods and transactions costs, we find that the average annual realized return for a stamp investor can match the after-cost return of the average equity investor.

The remainder of this paper is structured as follows. Section 2 briefly reviews the existing literature on stamp investments. Section 3 describes our data collection and methodology, while Section 4 reports the results of our research. Section 5 contains some important robustness checks and extensions. Section 6 concludes and outlines future work.

2. Literature

The price trends of many non-financial assets, going from stock exchange seats (Schwert, 1977) to commodities, have been discussed in the finance and economics literature. A particular strand of this literature looks into the economics of collectibles. There is, of course, a sizeable body of research on art investment, including Goetzmann (1993), Mei and Moses (2002), Ashenfelter and Graddy (2003), and Renneboog and Spaenjers (2009). However, scholars have also investigated markets for wine, coins, violins, and many other collectibles, for which studies of returns are reviewed by Burton and Jacobsen (1999).

Relatively few studies have looked into the long-term returns on stamps. This lack of research is especially striking given the financial values involved. Also, prior studies utilize US data, and consider relatively short time frames. Taylor (1983) applies a signal extraction method on transaction prices of the five most frequently auctioned stamps in his sample period to estimate quality-adjusted returns. He finds an average yearly return of 12.2% between 1963 and 1976. Cardell, Kling, and Petry (1995) also start from auction prices, but cover the period 1947-1988. They report an upward (and accelerating)

trend until 1980, with a fivefold price increase between 1976 and 1980. Thereafter, prices decline and level off.

The same authors have also studied whether stamps can function as a hedge against inflation. While Taylor (1983) cannot draw solid conclusions from his results due to the large standard errors of his coefficients, Cardell, Kling, and Petry (1995) find that the returns on stamps are positively related to expected inflation. Thiel and Petry (1995) confirm this positive relationship for US stamp auction data from the 1920s and 1930s.

Veld and Veld-Merkoulova (2007) suggest that there might be portfolio diversification benefits from investing in British stamps. When applying a capital asset pricing model to the SG100 index, the authors find positive alphas, and betas that are close to zero. However, the results do not lead to an implementable strategy, since the composition of the SG100 is private information. Also, the study is based on not more than four years of data. Nevertheless, the results seem to confirm previous findings by Cardell, Kling, and Petry (1995) that stamps may act as a partial hedge against movements in the large financial markets. Similarly, Taylor (1983) finds that most of the risk in his stamp portfolio is unsystematic relative to the equity market.

3. Data and methodology

To look into the long-term returns on British stamps, we need to construct a history of prices. Stamp prices are recorded in four standard, worldwide catalogues that are published on a periodic basis. They are the Stanley Gibbons Stamp Catalogue (UK), the Michel Katalog (Germany), the Scott Standard Postage Stamp Catalog (USA), and the Yvert et Tellier Catalogue de Timbres-Poste (France). While there are also other worldwide catalogues that are no longer in production and a substantial number of single-country catalogues, these four standard reference sources have been published for many years on an annual (or sometimes less frequent) cycle. Some consistency is maintained between successive editions, but there are no attempts to ensure consistency between publishers' catalogues. A time series of prices is therefore best constructed from a single publisher's

catalogue. Since our focus is on British stamps, the authoritative data source is the Stanley Gibbons publication.

We consult all Stanley Gibbons stamp price catalogues that have been published since the end of 1899. By that time the Stanley Gibbons catalogues had become the main source of reference of collectors of British stamps. We assign every catalogue to the end-of-year that is closest to the publication date. The first catalogue considered for this research is the 13th edition (year end 1899); the last one is the 111th edition that was published at the end of 2008. No stamp price catalogues were published around year ends 1900, 1905, 1909, 1916, 1918, 1921, 1923, 1942, 1945, 1947, and 1950. (Appendix B gives more details on the origins of the catalogues, the exact titles, the dates of publication, and the reasons for non-publication in the years listed above.)

We start by identifying the 50 most valuable British stamps in every catalogue. If there is more than one stamp with the cut-off value, then we include the oldest one in our data set, since collectors are often more concerned with earlier stamps. Even though some were originally printed in editions of millions only a limited number of copies have survived undamaged. Indeed, a study by Franses (2007) indicates that there are no more than a few hundred extant copies of many high-quality collectible stamps. For each stamp thus identified, we track the prices from that point forward. When necessary, we take into account changes in classification numbers. In order to being able to replace stamps in our indexes, we also make sure we have a reserve list of stamps for every year. We include both unused and used stamps in our analysis. Unused stamps of an issue are typically worth considerably more than the used stamps, though there are exceptions. We do not consider special varieties¹ and plates other than the main type, and we exclude issues of postage due stamps, control letters, and other non-regular stamps. We also track the prices of SG GB30 index constituents, for which we do not exclude any variety or plate number, but stick to the stated composition of this proprietary index.

¹ Special varieties are not attributed a main Stanley Gibbons classification number (such as *15* or *23a*) and often have different colors or printing errors. Until 1917, these (sometimes unique) varieties were not even included in the general list of stamps in the catalogues. An exception on the rule that we exclude these varieties is made for stamps that were already included in our database as regular types.

The Stanley Gibbons catalogue prices reflect both the company's own experience in supply and demand, and competitors' auction realizations, dealer prices or catalogue prices. Prices are always for examples in 'fine condition', whether used or unused. They represent the estimated selling prices of Stanley Gibbons at the time of publication of the catalogue and seem to be reliable estimates of prices. Two potential problems with using catalogue prices as the basis for the calculation of returns are that they lag market values and may not always reflect market conditions as accurately as auction prices (due to the managed price level). However, these issues should be less problematic over the very long term we are considering here. Also, although Taylor (1983) makes an argument for the use of actual transaction prices, his index based on catalogue prices is very similar to his quality-adjusted auction price index.

Our data set underpins a more consistent and longer-term analysis of the price trends of stamps than was previously possible. In the next section, we construct buy-and-hold portfolios starting at different points in time. Moreover, we build a price index that measures returns from collectible postage stamps since 1900. These returns are then compared to those from traditional financial assets.

4. Empirical results

4.1. Buy-and-hold portfolios

We start by constructing buy-and-hold portfolios every nine years, starting at year end 1899. Constructing a new portfolio every nine years allows us to compare returns over a manageable number of different buy-and-hold portfolios. Also, by choosing a time interval of nine years, we avoid all calendar years without stamp price catalogues. We denote the portfolios BH1899, BH1908, BH1917, etc. Our last buy-and-hold portfolio is constructed in 1998. Each time, we pick the 50 highest priced stamps from the Stanley Gibbons catalogues and track the sum of their prices over time. We thus create a price-weighted index. In total, 130 different stamps are (at least in one year) included in our twelve buy-and-hold portfolios. A complete overview of the composition of our portfolios is provided in Table 1.

[Table 1 about here]

Table 1 shows that two stamps have been in each top-50 of most valuable stamps since the beginning of our time frame: the unused stamps with classification numbers 5 (1840, 2d., blue) and 121 (1880, 2s., brown), see Fig. 1. Six more stamps, all dating from between 1867 and 1888, have been in every constructed portfolio since 1908. No stamps subsequent to 1935 are included in our portfolios. When investing in collectibles, it is generally thought that the rarest and highest denomination items sell for the highest price, but perhaps because less care is taken in storing low-denomination stamps, unused low face-value stamps can sell for a higher price than their high face-value counterparts.

[Figure 1 about here]

If a stamp (type) is exceptionally deleted from the catalogue, we replace it by the first (i.e. most valuable) item on our reserve list of the year of construction, and recalculate our index at the beginning of the year. Especially in the early years, it sometimes happens that no price for a stamp is quoted, for example when Stanley Gibbons did not have the item in stock. We then geometrically interpolate a price estimate from the two nearest price observations. In two cases, we do not have price observations for the last few years. We then estimate price trends since the last available price quotation from the evolution in value of the unused stamp with the same classification number.

The annualized (geometric mean) nominal returns of these buy-and-hold portfolios are reported in Table 2. The table reports the returns per time frame of nine years until 1998 and for the ten-year period 1999-2008. It also includes the overall returns since the construction of each portfolio.

[Table 2 about here]

Table 2 suggests that there was a steady, but slow growth in stamp prices during the first half of the twentieth century. Later, there were booms in stamp prices during the 1960s, 1970s, and 2000s. In particular, the average price increase between 1972 and 1980 is spectacular: more than 33% per year on all portfolios. However, the nominal price level of all portfolios declined slightly after 1980. The realized return on the buy-and-hold portfolios between 1981 and 1989 is -0.5%. Between 1990 and 1998 the returns are positive, but far from impressive. As mentioned before, prices have since risen sharply.

The annualized return on the buy-and-hold portfolio created at the start of the twentieth century (BH1899) amounts to 7.5%. The returns on this portfolio are not always in line with those on the other portfolios, because of the relatively large difference in composition between BH1899 and the later buy-and-hold portfolios. This is due to the fact that, for many portfolio constituents, price data only became available during the first decade of the twentieth century.

We now compare the returns on our buy-and-hold portfolios with the returns on the (back-tracked, buy-and-hold) SG GB30. The period we examine runs from the end of 1973 (the first year for which prices for all constituents are available) to the beginning of 2004 (the year of creation of the SG GB 30 index). If the SG GB30 suffers from a look-ahead bias, we would expect the index returns to overestimate the true returns on stamps. Therefore, Table 3 reports the returns on our buy-and-hold portfolios and the SG GB30 for two time frames before the launch of the SG GB30 (1974-2003 and 1990-2003), and since the same launch (2004-2008).

[Table 3 about here]

Table 3 shows that the returns on the back-tracked SG GB30 are in line with those on the buy-and-hold portfolios constructed in this study. In contrast to back-fitted equity indexes (see Dimson, Marsh, and Staunton, 2002), the returns on BH1971, the last constructed buy-and-hold portfolio before the start of the relevant time frame in 1974, are equal to the back-tracked returns on the SG GB30. This implies that the SG GB30, although ad hoc in its design and clearly launched at the start of a stamp price boom, still gives a good idea of the average stamp price evolution since the beginning of the 1970s. However, if we want to get a long-term view on the returns from collectible stamps, and compare these returns to those on a number of financial assets, the SG GB30 will not suffice. Therefore, we now turn to the construction of a periodically rebalanced price index for British stamps since 1900.

4.2. An index for postage stamps

Instead of considering a buy-and-hold portfolio, we construct an index which allows for changes in the constituents every nine years. As before, we start with the 50 most valuable stamps in 1899, we work with reserve lists, and aggregate the values of all stamps included. We adapt the composition of

our index at year ends 1908, 1917, etc. (and rebalance our index at those points), to make sure we are continuously tracking the price evolutions of the most important stamps. We treat missing prices in the way outlined in the previous section, but a stamp which does not have a price observation at the moment of rebalancing is replaced. Table 4 reports our results. For missing years, the index values are geometrically interpolated. The same table also shows the implied nominal returns.

[Table 4 about here]

Table 4 again illustrates the strong increases in stamp prices in the second half of the 1960s, throughout the 1970s and since 2000. In four years, we record a nominal return of more than 35%: 1969 (61.3%), 1976 (81.6%), 1979 (84.7%), and, most recently, 2008 (38.8%). Decreases in the nominal price level occur rarely, and in only three years do we see depreciations of more than one percent in the average catalogue prices: 1981 (-2.2%), 1982 (-10.4%), and 1992 (-1.1%). However, our index sometimes remains remarkably stable over relatively long time periods; consider 1983-1994 for a recent example. Over the whole 109 year time frame, the annualized return on the rebalanced portfolio is 6.7%.

Table 5 repeats the analysis, but shows the deflated index, using inflation data from Dimson, Marsh, and Staunton (2009). In real terms, it is clear that there have been several prolonged periods of price depreciation, for example from the beginning of 1906 until the end of 1920 (except in 1913), in the 1950s, and between year ends 1980 and 1994 (except in 1987). In contrast, we record the strongest price appreciations in the second half of the 1970s, when prices increased more than threefold in real terms, and, somewhat less pronounced, since the start of 2003, just before Stanley Gibbons created its SG GB30 index.

[Table 5 about here]

It is probably no coincidence that the largest increases in real stamp prices in the last 109 years took place in the inflationary period of the 1970s. At that time, real assets became very attractive as hedges: Ibbotson and Brinson (1993) show that, in the United States, oil, gold, farmland, and real estate showed very high returns between 1970 and 1980. Collectibles were no exception (Stoller, 1984), and investments in stamps were only one particular way “to lick inflation” (The Times, 1974). Stoller (1984) argues that when the inflationary pressure subsided and interest rates soared in the early

1980s, speculative expectations changed and prices fell. For many households, stamps became an “investment that turned sour” (The Times, 1984).

4.3. Stamps versus financial assets

Now that we have established a 109 history of the returns on British collectible postage stamps, we can compare these returns with those on UK bills, (government) bonds, and equities. The return data for these financial asset classes are from Dimson, Marsh, and Staunton (2009). The nominal price evolutions since year end 1899 are shown in Fig. 2, while Fig. 3 plots the real price trends.

[Figure 2 and Figure 3 about here]

Figures 2 and 3 show that equities have outperformed all other asset categories, including stamps, over the time frame 1900-2008. Equities have realized a yearly average nominal return of 9.2% (equivalent to a real return of 5.1%), while our stamp price index has grown by an annualized 6.7% in nominal terms (2.7% in real terms). However, over the very long term, stamps have enjoyed higher returns than bonds or bills, which record average real returns of less than 1.5%. Even before the stamp price boom in the 1970s, our stamp indexes have higher values than the indexes of bonds and bills. The successive negative real returns in the 1980s show, however, that stamps can also significantly underperform financial assets. A full overview of the distribution of the nominal and real returns on stamps and the financial assets can be found in Table 6.

[Table 6 about here]

Table 6 again shows that the mean returns on stamps are between those on bonds and equities (as are the Sharpe ratios). A dilemma when comparing the returns on collectibles with those on financial securities lies in the differences in transaction costs and average holding periods. We return to this issue in the next section.

At first sight, the standard deviation of the stamp returns seems higher than that of bonds in nominal terms, but lower in real terms. We are, however, underestimating the true standard deviation of stamp returns, for three different reasons. First, appraisals of an infrequently traded item’s value typically depend on previous price observations and are only partially adjusted in any period. The

return series is therefore prone to ‘appraisal smoothing’ (Geltner, 1991, 1993). Second, and closely related, since the index is an average of time-ordered values, the first differences in index levels can be expected to be autocorrelated. The return series will therefore suffer from the ‘Working effect’, which includes variability that is underestimated (Working, 1960; Schwert, 1990). Third, in 11 years, we use geometrically interpolated index values, which again smoothes the stamp return series.

A remedy for appraisal smoothing is to unsmooth the return series, a technique originated in the real estate literature by Geltner (1993) and applied subsequently to hedge funds (Kat and Brooks, 2002) and art index returns (Campbell, 2008). If we assume that all items are reappraised at the end of each period, the observed (or smoothed) return in period t , R_t^* , can be expressed as a weighted average of the true (underlying, unsmoothed) return in period t , R_t , and the smoothed return in the previous period, R_{t-1}^* :

$$R_t^* = (1-\alpha) R_t + \alpha R_{t-1}^* \quad (1).$$

Eq. (1) can be inverted to recover the unsmoothed return series from the observed returns:

$$R_t = (R_t^* - \alpha R_{t-1}^*) / (1-\alpha) \quad (2).$$

Inspection of the (partial) autocorrelogram suggests that the original real stamp return series follows an AR(1) process. This was confirmed by an analysis of the residuals using Portmanteau statistics. When the smoothed series follows an AR(1) process, one can set the coefficient α in Eq. (2) equal to the autocorrelation coefficient at lag 1. By construction, the newly constructed series will then have a first-order autocorrelation that is very close to zero, and the standard deviation of this unsmoothed return series is a better estimate of the true riskiness of stamp investments.

The first-order autocorrelation coefficients and the standard deviations of the smoothed and unsmoothed real returns are compared in Table 7. The same table also outlines the standard deviations of financial asset real returns. (Since we lose the first-year observation when unsmoothing the stamp data, we also exclude the first return when calculating the standard deviations of the original stamp returns or the returns on financial assets.) We see that the unsmoothed stamp return series has a standard deviation that is equal to 17.6%, which is almost 5% higher than the standard deviation of the original series, and also higher than that of the returns on bonds. To accommodate concerns about our interpolation of returns (and thus smoothing the index) in the first half century of our time frame, Table 7 also repeats the analysis for the real return series after 1951, which is the last year with an

interpolated return. The unsmoothed real stamp returns now have a standard deviation of 19.7%, which again is higher than that of bonds, and just below the standard deviation of stock returns. It is thus clear that the real riskiness of stamp investments, as measured by the volatility of returns, is probably not much different from that of investments in equity markets.

[Table 7 about here]

The previous observation that stamps seem to thrive in inflationary environments is somewhat corroborated by the return correlation matrix in Table 8, which shows a significantly positive correlation of 0.29 between the nominal returns on stamps and inflation. Only bills have a larger correlation coefficient (0.40). When considering real returns on stamps, however, we see a significantly negative correlation with inflation of -0.25 . This is comparable to the correlation coefficient between equities and inflation. We also recalculate the correlations using the unsmoothed stamp returns, but the results (not reported here) are very similar. In general, the real returns on stamps tend to be hurt by higher rates of inflation. It might be that investors only prefer real assets such as stamps when inflation rates rise above a certain level, as in the 1970s.

[Table 8 about here]

Table 8 reports a correlation between stamp and equity returns that is very close to zero. However, this might be due to the non-synchronous nature of the two types of returns. This non-synchronicity problem stems from three different sources. First, stamp prices probably adjust slowly to changes in financial markets. Second, catalogue prices partially reflect the pricing history, as mentioned before. Third, in order to calculate yearly stamp returns, we assign all published catalogues to the closest year end. This gives rise to a small discrepancy between the reported price trends of stamps and the timing of equity returns.

To gain more insight into the true equity market sensitivity of stamps, we therefore estimate the market model beta using the aggregated coefficients methodology of Dimson (1979), which accounts for non-synchronicity in asset returns. Dimson (1979) sums the slope coefficients in a regression on lagged, matching and leading market returns to get an unbiased estimate of the beta of an asset. The results for our series of real stamp and equity returns are shown in Table 9.

[Table 9 about here]

Although the traditional beta (estimated in Model 1) is very close to zero, we get a significantly positive beta of 0.23 when also including one lag and one lead in the analysis (Model 2), with a $\beta(-1)$ equal to 0.16 (and significantly larger than zero), indicating that it is mainly past equity market movements that matter. This beta grows to 0.34 with two lags and one lead (Model 3). When including three lags, $\beta(-3)$ is not significantly different from zero, while the other coefficients are virtually unchanged (not reported). Also repeating Model 3 with the unsmoothed real returns gives qualitatively similar results (not reported), although the $\beta(-1)$ rises to 0.23 and the $\beta(-2)$ declines somewhat. These results show that there is non-negligible positive correlation between equity returns and stamp returns, but that the systematic risk of stamps is still relatively low. The low beta of stamps is consistent with the observation that the recent credit crisis has not stopped stamp prices from rising.

We use the estimated Dimson beta for stamps of 0.34 to calculate the Treynor ratio, which measures excess returns per unit of systematic risk. In nominal terms, stamp investments have a Treynor ratio of 6.8, as compared to 6.0 for equities and 3.3 for bonds. The high Treynor ratio of stamps stands in contrast to a less impressive Sharpe ratio, which is based on risk expressed as the standard deviation of excess returns (see Table 6 above). The high Treynor ratio confirms the favorable risk adjusted reward from collectible stamps when they form a small part of a diversified portfolio of investment assets.

5. Robustness checks and extensions

It is possible that, as in equity markets, philatelic markets experience a size effect, whereby high-value collectible stamps have a long term performance that deviates from that of their lower-value counterparts. To investigate whether this is an issue within our index, instead of building value-weighted buy-and-hold portfolios, we undertake an analysis in which each constituent receives equal weight. This is analogous to investing the same amount of money (for example, GBP 100) in each of the 50 stamps included in the portfolio at the beginning of the time frame. This procedure gives rise to very similar results. For example, the annualized return on the buy-and-hold portfolio created at year end 1899 is also equal to 7.5%, and the arithmetic averages over all portfolios are very close to the

results outlined in Table 2. We conclude that there has not been a long-term size effect among high-quality British stamps.

To search further for a size effect, we calculate the returns on the portfolio of ten stamps that made up the reserve list at year end 1899. The annualized return on this portfolio is very similar to that of the buy-and-hold index portfolio constructed at that date. This reinforces our conclusion that index performance is not driven by the price trends in a few extremely rare stamps, but is representative of the broader population of investment-quality stamps

In the previous section, when no price was quoted for a specific stamp, we geometrically interpolated a price estimate from the two nearest observations for that stamp. To check the robustness of our results, we also use some other data-infilling procedures for missing stamp prices. This does not materially affect our results. For example, instead of using the two nearest price observations, we can also assume that in any given year the price movement of stamps with missing prices is identical to the one of a price-weighted portfolio of the stamps for which prices are available. This leads to index returns that are very similar to those reported before, reflecting the small number of missing prices and the relatively narrow dispersion in price trends across stamps.

The relatively small differences in price trends across stamps are also portrayed in Fig. 4, which shows different ratios of concentration within our index. Except around some rebalancing dates (such as year ends 1908, 1926, 1961) and during the turbulent 1970s, the percentage share of the most valuable stamp (or most valuable three stamps, or ten stamps) within the index do not see dramatic changes over short time intervals. Also, the fact that there is no clear trend in these ratios over time indicates that the most valuable stamps have not consistently had higher (or lower) returns than less highly priced ones, thereby becoming more (or less) important in the index.

[Figure 4 about here]

The transaction costs associated with buying and selling stamps amount to approximately 25% on a round-trip. Indeed, one can buy stamps at catalogue prices through Stanley Gibbons, but the company only buys back at about 75% of the catalogue price. Similarly, when trading through auction, one has to take account of the buyer's premiums and seller's commissions, which can add up to more than 20% of the underlying item's value. Stamps experience long holding periods (though this must be

partly endogenous, since high transactions costs presumably curtail trading volume). Considering the long holding periods for stamp collections and the short holding periods for equity investment (Barber and Odean, 2000), the transaction cost drag associated with an investment-quality stamp collection may actually be similar to that of an equity portfolio.

To develop after-cost estimates of annualized returns on stamps and equities, Table 10 corrects the baseline nominal average returns from Table 6 for differences in holding periods and transactions costs. For stamps, we assume a transaction cost at sale of 25%. We ignore custody costs, which are relatively low for stamps. Data on holding periods for stamps are hard to obtain, but there are sources on holding periods for art. An analysis of all resales within Reitlinger (1961) over the period 1760-1960 yields an average period between purchase and sale of 40 years. Despite some reservations about Reitlinger's data (Guerzoni, 1995), we regard 40 years as a reasonable estimate of the holding period for lifelong and cross-generational stamp collectors. Since ten years is the absolute minimum holding period that stamp investment publications recommend, we consider holding periods of 10, 25, and 40 years.

Commissions on buying and selling equities on the London Stock Exchange (LSE) have fluctuated over time, with an average for small transactions of 1.75% and for large transactions of 0.45%; in addition, the UK levies stamp duty on equity purchases, and this tax averages 0.92% over our sample interval.² Time series of effective trading spreads are not available for the United Kingdom, so we proxy them with Jones' (2002, page 42) estimates of bid-ask spreads for DJIA index constituents, which average approximately 0.5% for a round trip. The estimated one-way cost of equity trading is therefore the commission plus half the stamp duty plus half the spread, namely between 1.16% and 2.46%, depending on the size of the transaction. We ignore management fees and custody costs. Based on Dimson and Marsh (2009) and Jones (2002), we assume annualized turnover

² Green, Maggioni, and Murinde (2000) report marginal commission rates for small LSE transactions of 2.5% (1900-1909), 1.25% (1910-1917), 2.0833% (1918-1951), 1.3889% (1952-1959), 1.25% (1960-1975), 1.5% (1976-1981), and 1.65% (1982-1986), a rate which we assume persists after the 1986 deregulation. The commission rates for large transactions are 0.5% (1900-1951), 0.75% (1952-1959), 1.25% (1960-1968), 0.5% (1969-1970), and 0.125% (1971-1986), which we also assume persists after 1986. The rates of stamp duty are 0.5% (1900-1946), 2% (1947-1962), 1% (1963-1973), 2% (1974-1983), 1% (1984-1985), and subsequently 0.5% .

averaging 75% of market capitalization.³

[Table 10 about here]

Table 10 shows that the geometric average annual post-cost return on stamps gets close to – or can be higher than – that on equities once the holding period on stamps is long enough. Consistent with Barber, Lee, Liu, and Odean (2009), stock market investors lose a meaningful proportion of their wealth through trading, and it is clear that before-cost returns do not tell the whole story. The average stamp investor, who retains his collection for a long period, could earn returns similar to the average equity investor.

6. Conclusions and discussion

When the economic environment is uncertain, inflation runs high, or investors are looking for diversification, collectibles are promoted as an attractive and relatively safe haven for one's money. Therefore, in this paper, we have looked into the returns on British collectible stamps over the very long run. Since 1900, our price index of classic stamps has appreciated at a yearly average rate of 6.7% in nominal terms, which is equivalent to a real return of 2.7%. This is lower than the return on equities, but higher than that on bonds and bills. There have been some booms in the stamp market (in nominal and real terms), most notably in the second half of the 1970s, and in the current decade. However, during most of the 1980s, and well into the 1990s, our index has shown negative real returns.

After unsmoothing the stamp return series, we find that the standard deviation of the real returns is higher than that of bonds, and relatively close to that of equities. There is mixed evidence that stamps are a good hedge against inflation: although the highest real returns were reported in the late

³ Dimson and Marsh (2009) report quarterly equally weighted (EW) and market value weighted (VW) averages of the turnover of UK equities. Over the period 1993-2009, the mean EW average was 74.5% (standard deviation 91.9%), while the mean VW average was 89.5% (standard deviation 74.3%). For earlier periods, Jones' (2002, page 44) estimate of DJIA turnover is on average close to these levels, though with considerable time series fluctuation.

1970s (when inflation was high), there is still a significantly negative correlation between real stamp returns and inflation when considering the whole time frame. After accounting for non-synchronicity in the returns of stamps and equities, we conclude that there is a positive correlation between real equity and stamp returns, but that the beta of stamps is still relatively low. The Treynor ratio (the reward per unit of systematic risk) is as high for stamps as for equities. When taking into account differences in holding periods and in transaction costs, we find that the realized returns on stamps and equities may be closer to each other than one might conclude at first sight.

As an alternative asset class, stamps have characteristics that are clearly different from those of stocks or other financial securities. Just like other collectibles, stamps do not give rise to future cash flows, on which the valuation of traditional assets is based. As in the art market framework of Mandel (2009), the demand for stamps stems from the demand for saving and a utility dividend, which captures non-pecuniary benefits. These can include the aesthetic enjoyment of a collection of stamps, or the pride in having secured a rare issuance. Supply-side considerations, in contrast, may play a more important role in the stamp market than in the art market, since the scarcest stamps are generally the most valuable ones.

It is still unclear what drives the returns on collectibles. This paper has hinted at the existence of a wealth effect: there is a positive correlation between the returns on equities and those on stamps. It has also documented the use of collectibles as a hedge in highly inflationary environments. However, other factors may determine the price performance of collectibles. For example, the prominent stamp collector and leading investor William Gross (2006, 2008) argues that stamp prices may be driven by trends in GDP and in global liquidity. He may be right, but we do not know. We hope that the length and consistency of construction of our index series will facilitate further research in this area.

Appendix A: Stanley Gibbons stamp price indexes

SG100. Stanley Gibbons created the SG100 in 2002, prior to the launch of the SG GB30. The SG100 is a monthly updated index based on the prices for 100 of the world's most frequently traded stamps. The composition of the SG100 is not revealed. Also the exact way in which the index is

calculated is unclear, except that it “is weighted towards the most frequently traded and higher value stamps” and that the constituents are “carefully reassessed each year” (Stanley Gibbons, 2002).

SG GB30. Stanley Gibbons launched its index of 30 British rarities in 2004. All constituents of the *SG GB30* had a catalogue price of at least GBP 10,000 in 2004. The composition of the index is publicly known, and the index includes not only regular stamps with a main classification number but also stamps from different plates and non-regular (official) stamps. The index values are calculated by aggregating the individual catalogue prices of the constituents. According to Stanley Gibbons CEO Michael Hall, “stamps included in the index represent examples of the type of classic material recommended by the Stanley Gibbons Investment Department to its clients. Such stamps are considered to be the most likely to show consistent returns over the medium to long term” (interview with Michael Hall). The *SG GB30* index is updated on a yearly basis. Stanley Gibbons acknowledges that not every constituent of the *SG GB30* trades every year, so that the index may “lag behind the market” (interview with Michael Hall), even though Stanley Gibbons also takes into account general stamp market movements when updating catalogue prices. The rarest item in the *SG GB30* is *SG150* (plate 14), of which only six (used) copies are known to exist.

Appendix B: Stanley Gibbons price catalogues

The data for this study were taken from the Stanley Gibbons catalogues that contain prices for British stamps. In 1865, only nine years after he started selling stamps in his father’s shop, Edward Stanley Gibbons published a first ‘Descriptive Price List and Catalogue of British, Colonial and Foreign Postage stamps’ (Gibbons Stamp Monthly, 2006b). The 16-page list was the forerunner of a long series of price catalogues. Since the first editions were hardly complete and did not include catalogue numbers, we start our data collection at the end of the nineteenth century.

Throughout the decades, the names of the relevant catalogues have changed. For the first few decades, ‘Stamps of the British Empire’ was the first part of Stanley Gibbons’ three-volume set with stamps from all over the world. Later, this first part was renamed ‘British Commonwealth’ and split in two volumes (with stamps from Great Britain always included in the first volume). Most catalogues

were consulted at the British Library in London; a limited number of missing catalogues were purchased through online booksellers.

As is mentioned in the text, no catalogues were published around a number of years in the first half of our time frame. There are two reasons for this. First, during the initial decades of the twentieth century, Stanley Gibbons did not aim to publish a new catalogue every year. Second, in the 1940s, publication was sometimes impossible because of the war and a shortage of paper supply. There is anecdotal evidence, however, that stamp collecting itself remained popular throughout the war periods. For example, The New York Times (1920) reported that the First World War “did not stop stamp collecting” in Paris. Also, the Stanley Gibbons stamp shop in London remained open throughout the Second World War (Gibbons Stamp Monthly, 2006b). The market did not dry up completely during or after the war years.

We attribute each catalogue to the year end that is closest to its date of publication. We infer the month of publication from different sources of information: (i) the date it entered into the collection of the British Museum or Library (as evidenced by an ink stamp), (ii) the timing mentioned in the text of the catalogue itself (for example in the introduction or at the beginning of a section called New Announcements), and (iii) the publication date listed on Amazon.co.uk (for catalogues published since 1970). Of the 99 catalogues considered in this research, 89 appear to have been published in the second half of the calendar year. At the same time, in most cases, the next year’s date is mentioned on the cover. This validates our procedure.

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Table 2: Annualized returns buy-and-hold portfolios

	1900- 1908	1909- 1917	1917- 1926	1927- 1935	1936- 1944	1945- 1953	1954- 1962	1963- 1971	1972- 1980	1981- 1989	1990- 1998	1999- 2008	Total
BH1899	4.5%	2.0%	3.7%	3.4%	5.7%	7.5%	4.1%	10.9%	38.2%	-0.4%	2.4%	11.8%	7.5%
BH1908	-	1.3%	2.8%	5.6%	3.8%	4.4%	3.7%	13.4%	38.7%	-0.9%	2.3%	12.6%	7.6%
BH1917	-	-	3.1%	5.7%	3.6%	4.4%	3.5%	12.9%	37.6%	-0.8%	2.2%	12.8%	8.1%
BH1926	-	-	-	5.2%	3.6%	4.3%	3.2%	13.2%	37.3%	-0.7%	2.1%	13.3%	8.6%
BH1935	-	-	-	-	3.2%	3.8%	3.3%	12.9%	35.8%	-0.5%	1.8%	13.5%	8.8%
BH1944	-	-	-	-	-	3.9%	3.1%	12.8%	35.4%	-0.4%	1.6%	13.3%	9.5%
BH1953	-	-	-	-	-	-	3.1%	12.0%	35.0%	-0.4%	1.6%	13.2%	10.2%
BH1962	-	-	-	-	-	-	-	11.8%	33.5%	-0.2%	1.7%	13.4%	11.5%
BH1971	-	-	-	-	-	-	-	-	33.5%	-0.2%	1.6%	13.3%	11.4%
BH1980	-	-	-	-	-	-	-	-	-	-0.6%	1.5%	13.2%	4.8%
BH1989	-	-	-	-	-	-	-	-	-	-	1.6%	13.3%	7.6%
BH1998	-	-	-	-	-	-	-	-	-	-	-	13.3%	13.3%
Average	4.5%	1.6%	3.2%	5.0%	4.0%	4.7%	3.4%	12.5%	36.1%	-0.5%	1.9%	13.1%	

Notes. Table 2 reports the annualized (geometric mean) returns on the buy-and-hold portfolios per time frame of nine years (until 1998), and between 1999 and 2008. The composition of each portfolio can be found in Table 1. The last column ('Total') shows the annualized return of each portfolio between its creation and the end of 2008. The last row ('Average') reports the arithmetic average of the calculated returns for each time frame.

Table 3: Comparison of buy-and-hold portfolios with SG GB30

	<i>1974-2003</i>	<i>1990-2003</i>	<i>2004-2008</i>
BH1899	11.5%	4.5%	15.3%
BH1908	11.5%	4.7%	16.3%
BH1917	11.5%	4.7%	16.2%
BH1926	11.4%	4.7%	17.1%
BH1935	11.0%	4.4%	17.8%
BH1944	10.8%	4.3%	17.6%
BH1953	10.7%	4.2%	17.6%
BH1962	10.5%	4.3%	17.8%
BH1971	10.4%	4.3%	17.6%
BH1980	-	4.1%	17.7%
BH1989	-	4.1%	17.9%
BH1998	-	-	17.1%
SG GB30	10.4%	4.3%	17.6%

Notes. Table 3 reports the annualized (geometric mean) returns on the buy-and-hold portfolios until the launch of the SG GB30 and since the same launch in 2004. The composition of the buy-and-hold portfolios can be found in Table 1. Table 3 also includes the returns of the SG GB30 over the same time frames.

Table 4: Stamp price index values and nominal returns 1899-2008

<i>Year end</i>	<i>Index</i>	<i>Return</i>	<i>Year end</i>	<i>Index</i>	<i>Return</i>	<i>Year end</i>	<i>Index</i>	<i>Return</i>
1899	100.0	-	1936	348.7	1.4%	1973	2,815.6	18.1%
1900	109.4	9.4%	1937	355.0	1.8%	1974	3,336.3	18.5%
1901	119.7	9.4%	1938	357.2	0.6%	1975	4,429.4	32.8%
1902	130.7	9.2%	1939	362.1	1.4%	1976	8,043.4	81.6%
1903	139.8	7.0%	1940	362.3	0.0%	1977	10,796.8	34.2%
1904	144.8	3.6%	1941	369.4	2.0%	1978	13,711.6	27.0%
1905	145.8	0.6%	1942	396.4	7.3%	1979	25,331.6	84.7%
1906	146.7	0.6%	1943	425.3	7.3%	1980	31,279.5	23.5%
1907	146.3	-0.3%	1944	458.3	7.8%	1981	30,588.6	-2.2%
1908	148.0	1.2%	1945	500.7	9.2%	1982	27,415.1	-10.4%
1909	148.2	0.1%	1946	547.0	9.2%	1983	27,358.2	-0.2%
1910	148.3	0.1%	1947	587.9	7.5%	1984	27,373.3	0.1%
1911	149.3	0.7%	1948	631.9	7.5%	1985	27,422.7	0.2%
1912	149.9	0.4%	1949	639.6	1.2%	1986	27,559.4	0.5%
1913	150.3	0.3%	1950	640.1	0.1%	1987	28,853.8	4.7%
1914	164.1	9.2%	1951	640.6	0.1%	1988	29,153.7	1.0%
1915	164.4	0.2%	1952	646.0	0.9%	1989	29,647.2	1.7%
1916	165.1	0.4%	1953	646.0	0.0%	1990	29,721.3	0.2%
1917	165.7	0.4%	1954	644.7	-0.2%	1991	29,813.8	0.3%
1918	169.2	2.1%	1955	644.7	0.0%	1992	29,480.5	-1.1%
1919	172.7	2.1%	1956	648.8	0.6%	1993	29,499.0	0.1%
1920	189.0	9.4%	1957	650.3	0.2%	1994	29,628.7	0.4%
1921	198.1	4.8%	1958	660.5	1.6%	1995	31,221.2	5.4%
1922	207.6	4.8%	1959	687.1	4.0%	1996	32,147.1	3.0%
1923	212.0	2.1%	1960	769.0	11.9%	1997	32,147.1	0.0%
1924	216.4	2.1%	1961	806.0	4.8%	1998	34,061.9	6.0%
1925	216.8	0.2%	1962	853.1	5.8%	1999	35,853.6	5.3%
1926	217.7	0.4%	1963	853.1	0.0%	2000	40,443.6	12.8%
1927	242.9	11.6%	1964	866.1	1.5%	2001	41,865.6	3.5%
1928	260.2	7.1%	1965	1,113.4	28.6%	2002	45,762.2	9.3%
1929	285.1	9.6%	1966	1,200.5	7.8%	2003	52,085.2	13.8%
1930	296.5	4.0%	1967	1,256.4	4.7%	2004	63,165.6	21.3%
1931	298.5	0.7%	1968	1,290.8	2.7%	2005	70,052.6	10.9%
1932	301.8	1.1%	1969	2,082.3	61.3%	2006	77,955.2	11.3%
1933	306.8	1.7%	1970	2,286.8	9.8%	2007	85,492.2	9.7%
1934	341.9	11.4%	1971	2,321.6	1.5%	2008	118,653.1	38.8%
1935	343.7	0.6%	1972	2,383.5	2.7%			

Notes. Table 4 reports the index values of our rebalanced stamp price index from 1899 until 2008. It also shows yearly nominal returns.

Table 5: Stamp price index values and real returns 1899-2008

<i>Year end</i>	<i>Index</i>	<i>Return</i>	<i>Year end</i>	<i>Index</i>	<i>Return</i>	<i>Year end</i>	<i>Index</i>	<i>Return</i>
1899	100.0	-	1936	198.7	-1.2%	1973	351.6	6.8%
1900	107.2	7.2%	1937	190.9	-3.9%	1974	349.8	-0.5%
1901	116.1	8.4%	1938	197.0	3.2%	1975	371.8	6.3%
1902	125.5	8.1%	1939	180.1	-8.6%	1976	586.7	57.8%
1903	132.9	6.0%	1940	159.8	-11.2%	1977	702.3	19.7%
1904	137.7	3.6%	1941	158.1	-1.0%	1978	822.9	17.2%
1905	139.2	1.1%	1942	170.5	7.8%	1979	1,296.7	57.6%
1906	138.0	-0.9%	1943	183.9	7.9%	1980	1,390.9	7.3%
1907	133.8	-3.1%	1944	196.2	6.7%	1981	1,213.9	-12.7%
1908	133.4	-0.3%	1945	212.2	8.1%	1982	1,032.1	-15.0%
1909	132.9	-0.4%	1946	230.7	8.7%	1983	978.0	-5.2%
1910	131.7	-0.9%	1947	240.3	4.1%	1984	935.7	-4.3%
1911	129.6	-1.6%	1948	246.2	2.5%	1985	886.9	-5.2%
1912	127.8	-1.4%	1949	240.7	-2.2%	1986	859.4	-3.1%
1913	128.7	0.7%	1950	233.4	-3.0%	1987	867.7	1.0%
1914	128.3	-0.3%	1951	208.5	-10.7%	1988	821.1	-5.4%
1915	104.8	-18.4%	1952	197.7	-5.2%	1989	775.2	-5.6%
1916	86.1	-17.9%	1953	195.7	-1.0%	1990	710.7	-8.3%
1917	77.0	-10.5%	1954	187.8	-4.0%	1991	682.5	-4.0%
1918	66.1	-14.2%	1955	177.4	-5.5%	1992	657.9	-3.6%
1919	66.0	-0.2%	1956	173.3	-2.3%	1993	645.8	-1.8%
1920	60.4	-8.4%	1957	166.0	-4.2%	1994	630.4	-2.4%
1921	85.6	41.6%	1958	165.5	-0.3%	1995	643.6	2.1%
1922	99.2	15.9%	1959	172.2	4.0%	1996	646.8	0.5%
1923	103.0	3.8%	1960	189.3	9.9%	1997	624.1	-3.5%
1924	102.9	-0.1%	1961	190.1	0.4%	1998	643.6	3.1%
1925	105.4	2.4%	1962	196.0	3.1%	1999	665.7	3.4%
1926	104.6	-0.7%	1963	192.4	-1.8%	2000	729.6	9.6%
1927	123.6	18.1%	1964	186.4	-3.1%	2001	750.0	2.8%
1928	133.2	7.8%	1965	229.3	23.0%	2002	796.3	6.2%
1929	146.9	10.2%	1966	238.5	4.0%	2003	881.7	10.7%
1930	164.5	12.0%	1967	243.7	2.2%	2004	1,033.2	17.2%
1931	173.5	5.5%	1968	236.3	-3.0%	2005	1,121.1	8.5%
1932	181.6	4.6%	1969	364.2	54.1%	2006	1,194.6	6.6%
1933	184.6	1.7%	1970	370.7	1.8%	2007	1,259.2	5.4%
1934	204.2	10.6%	1971	345.2	-6.9%	2008	1,731.2	37.5%
1935	201.1	-1.5%	1972	329.2	-4.6%			

Notes. Table 5 reports the deflated index values of our rebalanced stamp price index from 1899 until 2008. It also shows yearly real returns.

Table 6: Distribution of returns on stamps and financial assets 1900-2008

		<i>Mean returns p.a.</i>		<i>Dispersion of annual returns</i>				<i>Sharpe</i>	
		Geometric	Arithmetic	S.D.	Lowest	Highest			
Nominal returns	Stamps	6.7%	7.4%	14.1%	-10.4%	1982	84.7%	1979	0.173
	Equities	9.2%	11.2%	21.8%	-48.8%	1974	145.6%	1975	0.281
	Bonds	5.4%	6.0%	11.9%	-17.4%	1974	53.1%	1982	0.079
	Bills	5.0%	5.1%	3.8%	0.5%	1946	17.2%	1980	
	Inflation	4.0%	4.2%	6.6%	-26.0%	1921	24.9%	1975	
Real returns	Stamps	2.7%	3.3%	12.8%	-18.4%	1915	57.8%	1976	0.173
	Equities	5.1%	7.0%	20.0%	-57.1%	1974	96.7%	1975	0.297
	Bonds	1.4%	2.3%	13.7%	-30.7%	1974	58.9%	1921	0.094
	Bills	1.1%	1.2%	6.3%	-15.4%	1915	42.3%	1921	

Notes. Table 6 reports the distribution of nominal and real returns for stamps and different UK financial asset classes. For each asset category, it shows the geometric and arithmetic average yearly return, the standard deviation, and the lowest and highest recorded return. Finally, it also shows the ex-post Sharpe ratios for stamps, equities and bonds, taking the returns on bills as a proxy for risk-free returns. The stamp return data are shown in Tables 4 and 5. The return data for equities, bonds, bills, and inflation come from Dimson, Marsh, and Staunton (2009).

Table 7: Autocorrelations and standard deviations of real returns on stamps

		<i>Since 1900</i>		<i>Since 1952</i>	
		Original	Unsmoothed	Original	Unsmoothed
First-order AC of real stamp returns		0.31	0.00	0.26	0.01
S.D. of real returns	Stamps	12.8%	17.6%	15.2%	19.7%
	Equities		20.1%		23.7%
	Bonds		13.8%		12.8%
	Bills		6.4%		3.4%

Notes. Table 7 reports the first-order autocorrelation coefficients for the periods 1900-2008 and 1952-2008, and standard deviations of both the original and the unsmoothed real stamp return series for the periods 1901-2008 and 1953-2008. For equities, bonds, and bills, it also shows the standard deviation of the real return series for the periods 1901-2008 and 1953-2008. The original stamp return data are shown in Tables 4 and 5. The return data for equities, bonds, and bills come from Dimson, Marsh, and Staunton (2009).

Table 8: Correlation matrix of returns on stamps and financial assets 1900-2008

	Stamps	Equities	Bonds	Bills	Inflation
Stamps	-	-0.02	0.07	0.32***	0.29***
Equities	-0.02	-	0.51***	0.18*	0.13
Bonds	0.23**	<i>0.53***</i>	-	0.29***	-0.06
Bills	0.35***	<i>0.26***</i>	<i>0.65***</i>	-	0.40***
Inflation	-0.25**	<i>-0.22**</i>	<i>-0.55***</i>	<i>-0.82***</i>	-

Notes. Table 8 reports the correlations of the nominal and real returns of stamps and different UK financial asset classes. It also includes the correlations with inflation. The correlation coefficients in italics are calculated based on real asset returns, while the others are based on nominal return data. The stamp return data are shown in Tables 4 and 5. The return data for equities, bonds, bills, and inflation come from Dimson, Marsh, and Staunton (2009). ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% level, respectively.

Table 9: Market model regressions

	$\beta(-2)$	$\beta(-1)$	$\beta(0)$	$\beta(+1)$	β	R2
Model 1	-	-	-0.01	-	-0.01	0.000
Model 2	-	0.16***	0.03	0.04	0.23**	0.068
Model 3	0.08	0.17***	0.04	0.05	0.34**	0.086

Notes. Table 9 reports the results of an OLS regression of real stamp returns on real UK equity market returns. $\beta(-2)$, $\beta(-1)$, $\beta(0)$, and $\beta(+1)$ are the slope coefficients on lagged (-2 and -1), matching (0), and leading (+1) returns on equities. β aggregates the individual slope coefficients into an unbiased estimate of the market model beta, using Dimson (1979). R2 is the R-squared, or the multiple correlation coefficient. The stamp return data is shown in Table 5. The return data for equities come from Dimson, Marsh, and Staunton (2009). ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% level, respectively. All coefficients are significantly smaller than one.

Table 10: Estimates of post-cost returns on stamps and equities

	<i>Nominal mean returns p.a.</i>	
	Geometric	Arithmetic
Stamps	6.7%	7.4%
Post-cost returns, assuming:		
• transaction cost at sale of 25%		
• holding period of : 10 years	4.2%	4.9%
25 years	5.7%	6.4%
40 years	6.1%	6.8%
Equities	9.2%	11.2%
Post-cost returns, assuming:		
• annual turnover of 75%		
• one-way transaction cost of: 1.16%	7.5%	9.4%
2.46%	5.5%	7.4%

Notes. Table 10 estimates the average annual nominal returns on stamps and equities after costs over our time frame. The baseline results in bold are taken from Table 6. The post-cost returns are estimated correcting the baseline (geometric or arithmetic) average returns for differences in annualized transaction costs between the two assets. For stamps, we assume a transaction cost at sale of 25% of the underlying value, and holding periods of 10, 25, and 40 years. For equities, we assume an annual turnover of 75% and one-way transaction costs of 1.16% and 2.46%. A motivation for these assumptions can be found in Section 5 of this paper.

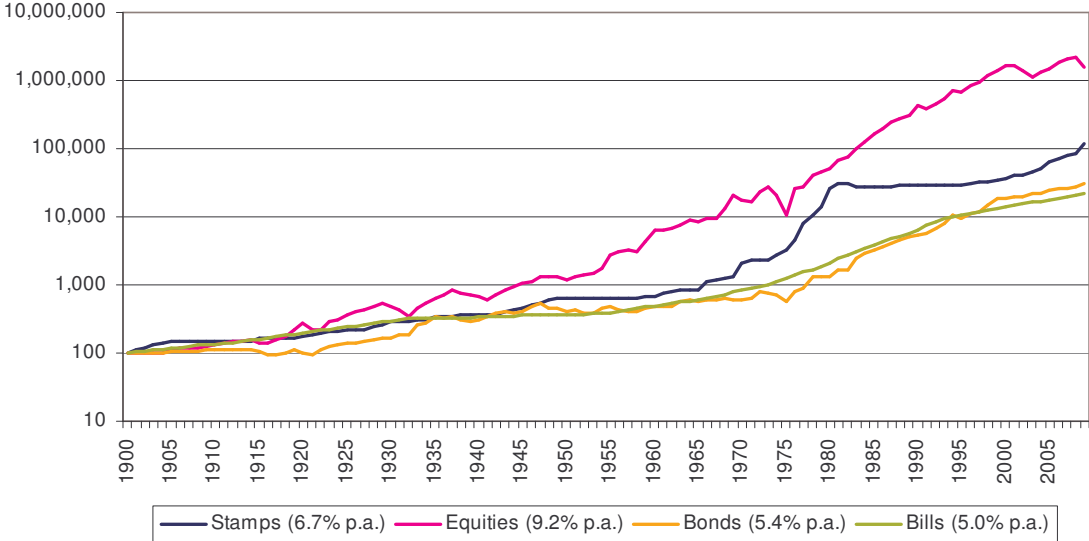
Figure 1: The two stamps that have consistently been among the top-50 from 1900 to 2008

SG classification no. 5, 1840, 2d., blue (unused) SG classification no. 121, 1880, 2s., brown (unused)



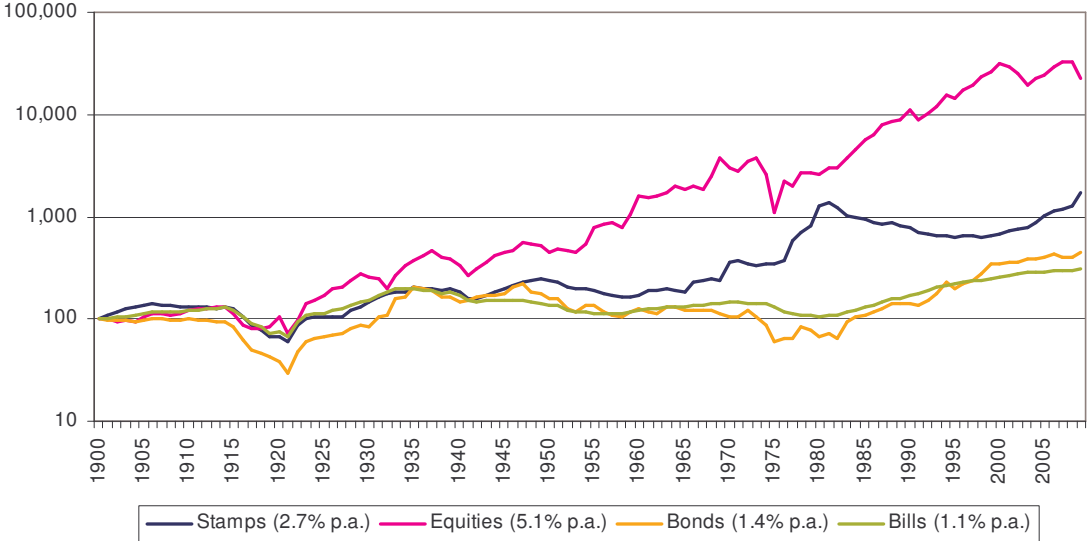
Notes. Figure 1 shows the two stamps that have been in each buy-and-hold portfolio constructed since year end 1899. These stamps have thus consistently been among the 50 most valuable ones in the price catalogues considered in this research.

Figure 2: Cumulative returns on stamps and financial assets in nominal terms 1900-2008



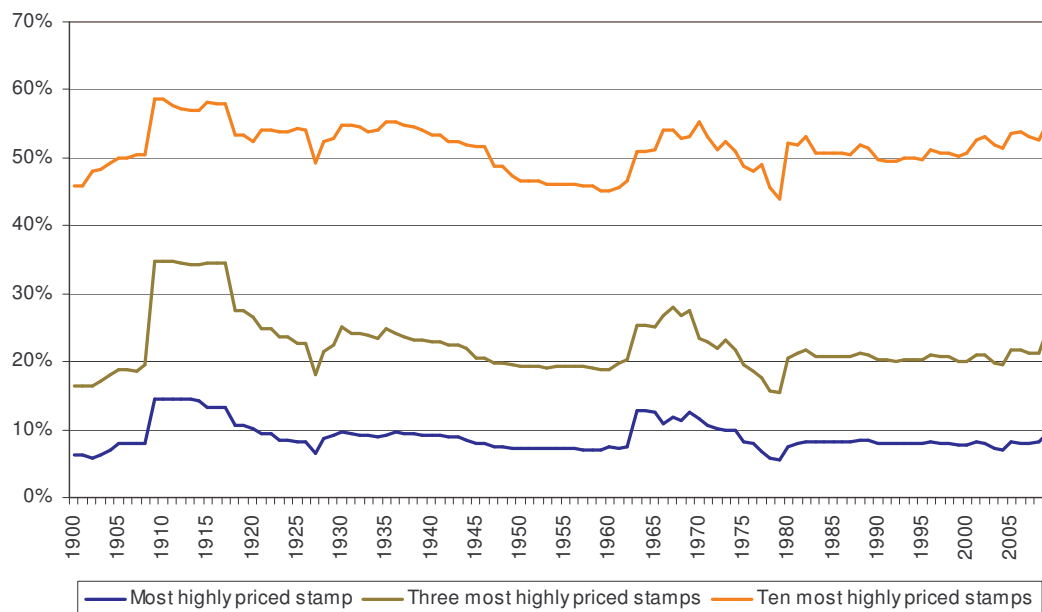
Notes. Figure 2 shows the nominal index values for UK stamps, equities, bonds and bills over the time frame 1900-2008. It also present the geometric average nominal return per annum (p.a.) for each asset category. The index is put equal to 100 at the beginning of 1900. The stamp price index data are shown in Table 4. The return data for equities, bonds, bills, and inflation come from Dimson, Marsh, and Staunton (2009).

Figure 3: Cumulative returns on stamps and financial assets in real terms 1900-2008



Notes. Figure 3 shows the real, i.e. deflated, index values for UK stamps, equities, bonds and bills over the time frame 1900-2008. It also present the geometric average real return per annum (p.a.) for each asset category. The index is put equal to 100 at the beginning of 1900. The stamp price index data are shown in Table 5. The return data for equities, bonds, bills, and inflation come from Dimson, Marsh, and Staunton (2009).

Figure 4: Concentration within the stamp price index 1900-2008



Notes. Figure 4 shows the evolution of the ratio of the (total) value of the most highly priced stamp, the three most highly priced stamps, and the ten most highly priced stamps to the total value of all 50 stamps in our index, over the time frame 1900-2008. The concentration ratio is expressed as a percentage.