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### Journal Item

How to cite:

Rutterford, Janette and Sotiropoulos, Dimitris (2016). Putting all their eggs in one basket? Portfolio diversification 1870 to 1902. *Accounting History Review*, 26(3) pp. 285–305.

For guidance on citations see [FAQs](#).

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Version: Accepted Manuscript

Link(s) to article on publisher's website:

<http://dx.doi.org/doi:10.1080/21552851.2016.1219464>

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# Putting all their eggs in one basket?

## Portfolio diversification 1870 to 1902

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[Draft July 2016; forthcoming in *Accounting History Review*]

**Abstract:** There are a number of reasons why investor portfolio characteristics are of interest. First, there is limited evidence of what individual investors actually held in their portfolios in the past, including, for example, whether there were significant differences between male and female investors. Second, investors' portfolio holdings are relevant to the debate on the 'democratisation' of investment and, third, they inform the debate on whether investors in the past made efforts to reduce portfolio risk through diversification, before the full 'scientific' approach of the early twentieth century and the Markowitz optimisation approach of the mid-twentieth century. This paper explores the portfolio choices made by a sample of 508 investors – 263 men and 245 women - between 1870 and 1902. There is evidence of diversification, with the average holding of the sample being 4.6 securities. There is also evidence of increasing levels of diversification over time, of international diversification, and greater diversification by wealthy men and women. Investors in the past clearly made efforts to reduce portfolio risk before Markowitz optimisation.

**Key words:** Modern portfolio theory, diversification, portfolio characteristics, portfolio risk.

*We hold that, by a careful selection from the various media of investment, very remunerative returns in the shape of interest may be obtained; while, by a proper division of risks, not only may the security for the principal be rendered perfectly satisfactory, but there may be a good prospect that the invested capital will steadily increase in value (Chadwicks' Investment Circular [1870, 30-1]).*

## **1. Introduction**

This paper explores the portfolio choices made by a sample of investors in the late nineteenth century. There are a number of reasons why such investor portfolio characteristics are of interest. First, there is limited evidence of what individual investors held in their portfolios in the past, from the introduction of limited liability in the mid-nineteenth century and the dramatic rise in the number of individual investors, right up to today. In particular, little work has been done on who these investors were (in particular, their gender) where they lived, which financial securities they held, and why. Work by authors such as Rutterford et al. (2011) has attempted to tackle this by analysing shareholder registers covering ownership in company debentures, preferred and in ordinary shares. This line of research has commented on the ‘democratisation’ of investment (see also Rutterford and Sotiropoulos [2016]). Such research has documented a major increase in the number of investors during the last quarter of the nineteenth century and in the early years of the twentieth century, spurred on by an increase in the number of government, municipal and corporate securities; by increasing per capita wealth; by increasingly sophisticated marketing techniques; and by the flourishing of investment-related periodicals and books (Rutterford and Maltby [2006], Rutterford et al. [2011]). These research studies have also highlighted trends such as a move away from investing in local shares, the rising importance of London as a stock exchange, and also the

dramatic rise of women investors, particularly in high yield, brand-name, colonial and low-risk securities. They also show a rise in married women holding securities after the Married Women's Property Acts of 1870 and 1882. Recent research has highlighted changes in the nature of the shareholding population, with new evidence on trends in their geographic dispersion, their gender, the size of their holdings, and their attitude to risk (Foreman-Peck and Hannah [2011] and [2013], Rutterford and Maltby [2007], Rutterford et al. [2009], Green and Rutterford [2009], Rutterford and Sotiropoulos [2016]).<sup>1</sup> Although there is evidence of these trends from share registers, there has to date been limited research on individual investor portfolios, what these investors held, how this changed over time, and whether there were gender differences in portfolio characteristics.

A second reason why investors' portfolio holdings are of interest is related to the debate on the democratisation of investment. There is evidence that the number of British individual investors in financial securities grew from the mid-nineteenth century onwards. This rise in the numbers of shareholders came to be called 'people's capitalism', 'shareholder democracy' or the 'democratisation of investment' (Ott [2011]. Traflet [2013], Rutterford and Sotiropoulos [2016]). In Britain, Ellis Powell, writing in 1910, referred to an insidious and long-term democratisation 'entirely compressed within the last half century', but boosted by the sale of government bonds during and after World War I. He contrasted the handful of large individual shareholdings in the share register of the Alamillos Company in 1864 with the much smaller and more numerous individual holdings in 1920s share registers for Liptons, Harrods or Selfridge's (Powell [1910, 243-4]).

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<sup>1</sup> Most of this work has been on the UK rather than the US where lack of access to shareholder records hinders research in this area. Similar research is also progressing on other countries. For work on Swedish, Canadian, Australian, Canadian and Italian shareholders, see Laurence et al. (2009) and Green et al. (2011).

Shareholder numbers in Britain were easy to estimate with companies being required to register shareholder lists with the Registrar of Companies from the 1840s. For example, it was public knowledge at the time that J. P. Coats had 25,000 shareholders in 1896 and Lipton's, the tea company, had 74,000 in 1888. A Board of Trade return noted over 750,000 railway shareholders in 1896 and Clapham suggests that, by 1913, there were 1.2 million investors in railways and banks (Rutterford and Sotiropoulos [2016]). However, there was much confusion between the number of shareholdings and the number of shareholders. The crucial missing estimate is the average number of shares held per investor which requires analysis of individual investor portfolios rather than shareholder lists.

As there is very little information available on the characteristics of early investor portfolios, researchers have been reduced to 'guesstimates'. For example, Foreman-Peck and Hannah (1911), in their study of shareholdings in 335 British companies in 1911, use an estimate of 3 shares per portfolio (from Warshaw [1924] for the US) to 7 to 8 shares (from the recommended number of holdings for a medium-sized portfolio in an investment text by Henry Lowenfeld [1907, 85], entitled *Investment an Exact Science* published in 1907) to arrive at a British shareholder population of between 800,000 to 2 million. There is therefore clearly a need to determine how many securities were held in the typical portfolio and how this changed over time.

A third reason to analyse portfolio holdings is to explore the extent to which investors attempted to manage risk before modern mathematical techniques were introduced. Today, investors are assumed to be risk averse, wanting to maximise expected return for a given level of risk, or minimise risk for a given level of expected return. Modern Portfolio Theory (MPT), formalised by Markowitz (1952), was a model which allowed investors to do this, by

taking into account expected returns, risk as measured by the standard deviation of returns, and correlations of securities. The Capital Asset Pricing Model (CAPM), mostly associated with the names of Sharpe (1964) and Lintner (1965), extended MPT to introduce the concept of systematic risk and unsystematic risk of securities: there is no risk premium for the latter, under the CAPM, because there can be no premium for bearing risks that can be eliminated through diversification.

However, prior to MPT and the CAPM, investors could not avoid the issue, as they were faced with a bewildering choice of securities of different risks and characteristics, from all parts of the world. It is acknowledged, even by Markowitz himself (Markowitz [1999]), that general concepts of diversification existed prior to the development of MPT. For the UK, business historians have argued that this awareness extends back to the last quarter of the late nineteenth century (Cheffins [2010, 127]) and even to the aftermath of the Glorious Revolution in the seventeenth century (Carlos et al. [2015]). There is also textual evidence that the basic principles of diversification together with related portfolio selection techniques, were widely discussed and promoted by financial analysts as early as the 1870s (Goetzmann and Ukhov [2006]; Rutterford and Sotiropoulos [2015b]). Indeed, by the first decade of the twentieth century, authors such as Lowenfeld were promoting a more sophisticated, top-down risk reduction approach, termed the ‘geographical distribution of capital’ (Lowenfeld [1907], [1909] and [1911]). Yet, to date, few researchers have explored whether and how investors *in practice* attempted to use risk reduction techniques, in particular portfolio diversification, prior to the introduction of MPT.<sup>2</sup>

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<sup>2</sup> See, for example, Goetzmann and Ukhov (2006), Chabot and Kurz (2010), Edlinger and Parent (2013), Scott (2002).

There has been some work done on optimal portfolio diversification pre-Markowitz at the macro level. For example, there has been discussion of whether the actual portfolios held by British investors during the period up to World War I, could have been optimal or inefficient in a Markowitz risk-return sense (Goetzmann and Ukhov [2006], Chabot and Kurz [2010]). One way of looking at this has been the need to explain the high proportion of foreign securities listed on the London Stock Exchange which were held by investors at that time. Edelstein (1982), for example, examining the period 1870 to 1913 from the perspective of 1982, found that foreign equities earned on average 1.58% per annum more than domestic equities. Goetzmann and Ukhov (2006), extending this analysis, have considered whether investors during this period may have instinctively taken account of the *correlation* between asset classes when choosing their portfolio asset allocation. Using Edelstein's data and considering 11 UK equity classes and four world-wide equity classes, the authors find that the optimal percentage of overseas *equities* for investors to have held between 1870 and 1913 was 38% (Table X). They assert that this is close to the actual percentage held: estimates of actual overseas content in British portfolios range from 28% (Hobson, 1902) to 47.4% (Edelstein, 1982) with an average of around 34% (Goetzmann and Ukhov, 2006).

This diversification benefit persists, although less important, when returns on overseas equities are assumed to be the same as for their UK equivalents and also when foreign debt and UK debt are included in the analysis. . The authors assumed that investors at the time understood the concept if not the mathematics of correlation and that their behaviour was consistent with the recommendations obtained by applying MPT to their portfolio selections. They, and others, point to financial advice at the time recommending international diversification, albeit naïve, as a strategy to improve portfolio yields whilst reducing portfolio risk (Goetzman and Ukhov [2006], Sotiropoulos and Rutterford [2015b]). However, the



authors had no individual portfolios with which to confirm their macro country level results. Mitchell, Chambers and Crafts (2012) have looked at the Edelstein data from a different perspective. They have identified the optimal portfolio percentage, not in international investments, but in railways, which investors should have held over the period 1884 to 1913. They find that an optimal proportion of UK, foreign and colonial railway securities in a global portfolio varied between 27.0% in 1884 and 40.7% in 1913, peaking at 55.1% in 1893, with the proportion of non- domestic railways within these totals varying between 4.5% in 1887 and 37.1% in 1911 (Mitchell et al. [2011, 822-3]).

Thus, in the same way as the shareholder numbers debate has been hampered by the lack of information on the typical number of securities in individual portfolios, so the diversification debate has been hampered by lack of information on which types of securities were actually held. A number of investor diversification measures can be calculated – the number of securities held; a measure of naïve diversification called the diversification coefficient; up to a measure which takes account of risk, return and correlation in a domestic or international context. Goetzmann and Kumar (2008) looked at US investor trading portfolios in the 1990s and measured investor sophistication using a number of these measures. They did not have access to investor portfolios, only their trading accounts. Friend, Blume and Crockett (1974) sampled 1971 US IRS returns to measure the extent of diversification of US individual investor portfolios. There is now clearly a need for more work on how investors diversified in practice, both domestically and internationally, prior to the development of MPT.

The remainder of this paper is as follows. We first explore the investment context in which these portfolios were held. We then explore actual portfolios containing 2,316 individual securities, held by a sample of 508 British investors at death in the period 1870 to 1902, in

the context of the three themes above. We first examine the characteristics of these portfolios, what they invested in and how this differed between male and female investors, and how these portfolio characteristics changed over the period. We then turn to how many securities these investors held, and explore simple measures of diversification. By so doing, we can provide data on *actual* numbers of securities held in portfolios and begin to analyse the actual diversification strategies of individual British investors during the period, both with respect to number of securities, whether they adopted naïve diversification, and how they diversified across sectors and countries. The final section contains the summary and conclusions.

## **2. Investment context**

From the second half of the nineteenth century, after the introduction of limited liability in 1856 (and its extension in 1862), the UK experienced a widening of participation in financial investment. The developed character of UK stock exchanges, the rise of listed companies, the wide dispersion of shareholdings and the so-called gradual divorce of ownership from control have been noted (for example, see Cheffins [2010] and Rutterford et al. [2011]). From at least the early 1970s, individual investors became increasingly confronted with the question of how to manage their investments in the face of uncertainty and increasingly globalised financial markets.

In the period under consideration, the late nineteenth and early twentieth century, UK government bonds, known as Consols, were generally considered as the risk-free benchmark, against which all other securities could be compared. Trustee securities, those which could be bought for trusts which did not allow trustees free rein for investments, were also considered

relatively safe.<sup>3</sup> For example, government bonds, such as those issued by the Indian government, were considered to be as low risk as home government bonds but offered a higher return: ‘The security of the Indian Government is scarcely, if at all, inferior to that of the British Government itself; for where would be the prestige of the British name were we to allow our Indian empire to be wrested from us by any power whatever?’ (Chadwicks’ Investment Circular ([1870, 52])).

The risk hierarchy moved up the scale from such government-guaranteed bonds, through priority corporate securities, to dividend-paying shares. Risk was reflected in the desired level of yield on each security – the riskier it was, the higher the required yield: ‘The higher the rate of interest, the worse the security’ (Beeton [1870, 26]). Once this had been determined, the investor could minimise risk in a number of ways.<sup>4</sup> The first was to avoid investing in categories of security that were considered too high up the risk scale, the higher yield being deemed not worth the risk of interrupted income and/or capital loss (that is looking at risk-adjusted returns). The second was to spend time investigating each security in depth, by studying the accounts and reading newspapers, or by consulting advisers.<sup>5</sup> The third method of reducing risk was to spread risk across different securities. Initially done as an ad hoc

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<sup>3</sup> A trust is an arrangement whereby a person (trustee) holds property as its nominal owner for the good of one or more beneficiaries. In this instance trusts were often set up for widows and children, on the death of the husband. Prior to 1893, trustees who were restricted to investing only in so-called ‘trustee investments’ could only purchase Consols. The Trustee Act of 1893 allowed trustees to purchase safe British and colonial government stocks, in particular those of India, UK and Indian Railway debentures and some ‘safe’ railway preference shares, as well as Bank of England and Bank of Ireland stock.

<sup>4</sup> This categorisation is not explicit in the texts of the period, but it is implied by them. For further discussion, see Rutterford (2004) on how yields were used as a valuation tool to take account of risk.

<sup>5</sup> Another way for investors to improve information flow was to live close to the company’s headquarters, area of operations and/or location of annual general meetings. For more discussion on local investment bias at the time, see Rutterford *et al.* (2015a).

‘extension’ to a limited portfolio, by the early twentieth century a global diversification strategy had been developed.

Spreading risk across a number of securities was widely promoted by the 1870s. Financial advisers and analysts offered recommendations as how to combine a number of investments in a portfolio. For example, after acknowledging the British investor’s preference for none but British securities, *Chadwicks’ Investment Circular* in 1870 argued:

We are now too much alive to our own interests to place our trust in Consols alone; for indeed the British Government Funds cannot accommodate a tithe of the money that is always pressing forward for investment. Moreover, Railways, and even Foreign Stocks, have been found to pay better in the long run. We hold that, by a careful selection from the various media of investment, very remunerative returns in the shape of interest may be obtained; while, by a proper division of risks, not only may the *security* for the principal be rendered perfectly satisfactory, but there may be a good prospect that the invested capital will steadily increase in value (Chadwicks' Investment Circular [1870, 30-1]).

The authors of *Chadwicks’ Investment Circular* provided an empirical example of how such ‘proper division’ of risks might work in practice. Choosing four securities of very different types then dealt on the Stock Exchange, they showed that, had one invested £1,000 each in Three per cent Consols, Spanish Three per cents, Turkish Six per cents, and London and Western railway shares ten years before, the annual income yield would have ranged from 3¼% for Consols to 10¾% for Turkish bonds. They also took the change in principal value over the ten years into account, and showed how the total annual (simple interest) return on investment would have been 3 per cent for Consols, the same for Spanish Three per cents, 8¼% per cent for Home Railway Stocks, and a sizeable 11⅜% on Turkish Six per Cents.

They concluded that: ‘the best mode of employing money would thus appear to consist in making a judicious selection amongst Home Railways and Foreign Stocks’ (Chadwicks’ Investment Circular [1870, 32]).

A key development in the understanding of the benefits of diversification took place at the beginning of the twentieth century. Instead of adding as many risky securities as required to generate the targeted yield, some investment advisers began to realise that a more standardised approach to portfolio construction was desirable, targeting a particular level of yield *and* reducing capital risk through investing *equal* amounts in a larger number of different types of securities, or so-called ‘naïve diversification’. An early twentieth century example of this approach is from a 1908 Pamphlet by ‘W.B’ (anonymous) entitled *Women as Investors*. In a list of important principles and rules, the author recommends that women readers should ‘spread the capital over a number of concerns, and do not keep to one class of investment, so that if one or more are failures, there may remain others which are not’ (W.B. [1908, 29]). At the same time, investors were also advised against investing ‘more than about one tenth of the capital in any one concern, unless personally occupied in its management and control’ (ibid.).

A more complex diversification strategy was actively promoted by a number of contributors to the *Financial Review of Reviews*, a monthly magazine first published in 1905, and in textbooks such as *Investment an Exact Science*, authored by Lowenfeld, also a major contributor to the *Financial Review of Reviews*. This method proposed not just investing in randomly chosen unrelated securities but to diversify as much as possible by investing in all possible regions of the world. Lowenfeld (1909) split the world into nine regions by dividing Europe into North and South, as well as adding an ‘international’ grouping, made up of

companies operating on a global scale: international trusts, shipping, telegraph, marine insurance, etc. He and other authors recommended investing in each region of the world, and in a variety of types of security in each region, should funds permit. Crozier (1910, 113) for example, suggested spreading the securities of any one country across a number of different sectors such as government, railways, shipping, banks and industrials. Lowenfeld (1911, 79-87) argued, however that each security for each region should be of the same type of instrument, with preference shares and debentures preferred to equities, the latter being deemed more exposed to market volatility.

In terms of how much to invest in each security, investment advisers in general recommended ten securities. The choice of ten securities in total tallied nicely with Lowenfeld's nine regions of the globe plus one 'international' sector. Withers (1930, 41) also argued that, with ten securities, individual investments were large enough for the investor to have the power to realise a substantial portion of his invested capital whilst being few enough to allow the investor to monitor his portfolio and watch for any investments which required replacing. However, some allowance was made for the amount of money invested: for example, Lowenfeld recommended holding 5 to 6 stocks for an investment of £500 to £1,000 and 8 to 10 stocks for £5,000 to £20,000 (Lowenfeld [1907], 85).

The fundamental assumption in all these discussions was that security prices and returns were 'dominantly influenced by the trading conditions of the particular country in which they are principally held and dealt in' thus following the country specific business cycle (Lowenfeld [1907, 61], Crozier [1910, 120]). The authors showed through diagrams that securities from the same country could be seen to be move together. Domestic diversification was not ruled out but the selection of securities would be more difficult and demanding for the ordinary investor while the portfolio itself would be heavily reliant on domestic market movements

(see Lowenfeld [1907, 106-7]). While diversification was perceived as a ‘systematic method of averaging risks’ (Lowenfeld [1907, 61]) or, alternatively as a method to neutralize and balance risks against each other (Crozier [1910]), in practice it became a method of ‘geographical distribution of capital’. Top down international diversification was thought to offer more beneficial covariances than domestic diversification as it allowed investors to ‘obtain as great a contrast as is possible in the trade influences which govern each one of his holdings’ (ibid.: 90).

### **3. Data characteristics and analysis**

The data sample used in this paper is derived from the IR19 series on the valuation of property for the purposes of paying legacy, succession and estate duties levied at the time of death, collected as part of an ESRC research project. The Residuary Accounts for the assessment of this tax that have survived provide detailed information on an individual’s personal wealth.<sup>6</sup> Of the 1,446 individuals for whom we have information on their assets and liabilities at death, for the period 1870 to 1902, 515 held *financial* assets and, of these, 508 had portfolios which could be analysed, as the files included descriptions of the investments held at death.

There are some limitations to these data. In the first place, the data only refer to those individuals who owned sufficient assets at the time of their death to warrant the submission of accounts for the assessment of death duties. Second, any evidence derived at the end of life

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<sup>6</sup> IR19 Board of Stamps: Legacy Duty Office and successors: Specimens of Death Duty Account, 1796–1903, The National Archives, Kew, UK. The data were collected as part of ESRC research project RES-000-23-1435. For further discussion and analysis of this data sample, see Green et al. (2011). See also Green et al (2007).

will have an inevitable age bias towards the elderly.<sup>7</sup> In relation to the wealth holding population as a whole, therefore, the sources are likely to result in an overestimation of the relative significance of stocks and shares.<sup>8</sup> The sample is a 100% sample of the 1,446 individuals whose Residuary Accounts have been preserved and who died in England and Wales between 1870 and 1902.<sup>9</sup> This sample of a much larger population appears to be representative of the population at large, with no geographical bias to the series. Rutterford et al. (2011: 176-7). We now turn to analyse the characteristics of the investor portfolio sample.

[TABLE 1 NEAR HERE]

Table 1 shows the age, gender and marital characteristics of the sample for each of four sub-periods between 1870 and 1902. Of the total 508 individuals, 263 were male, 245 female. The proportion of women increases after the first sub-period, with an almost equal number thereafter until 1902. However, this increase in the female proportion of the sample does not appear to be related to the freedoms given to women who married after 1870 nor to those who married after 1882.<sup>10</sup> Given the high average age at death, very few married women during the period 1870-1902 are likely to have benefitted from the ability, after the Married Women's Property Acts (MWPAs), to hold shares in their own name rather than that of their husband. This view appears supported by the fact that, of a total of 245 women in the sample,

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<sup>7</sup> For the sample of 1,276 of the 1,446 Residuary Accounts for which it was possible to establish age at death, the average age for males was 60.3 and for females 64.4. See Green et al. (2011).

<sup>8</sup> For further discussion of this point, see Green et al. (2011).

<sup>9</sup> This figure reflects the total number of records preserved in the IR19 series which ends in 1902. This was a small proportion of the total actually submitted, the remainder having been destroyed. However, the sample itself appears to be representative of the broader population from which it was drawn.

<sup>10</sup> The MWPA of 1870 did not allow married women to own real estate in their own name. Married women also required their husbands' permission to own assets separately. It was not until the MWPA of 1882 that married women acquired the same rights as single women and men with respect to owning financial assets (Rutterford and Maltby, 2006, 115-116).



only 16 (7%) were married and a further 3 (1%) of unknown marital status. In contrast, 87 (36%) were widows and 139 (57%) were single women, both of which categories had the same legal rights as men with respect to investment, including the right to vote at annual general meetings (Rutterford and Maltby [2006]). Perhaps the most surprising aspect of the sample is the average and maximum age at death, 63 and 93 respectively for men, and 67 and 93 for women.<sup>11</sup> Wealth may well have allowed a longer life expectancy. For example, more than half the women were unmarried and therefore unlikely to have borne the risk of childbirth and it is unlikely that many of these women had onerous working lives.

[TABLES 2 AND 3 NEAR HERE]

Table 2 shows the total or gross wealth characteristics of the sample including, as well as their financial portfolios, their holdings in real estate, life assurance, personal loans and cash (for definitions see the notes of Table 2). The difference between gross and net wealth represents their liabilities, such as debts. The average gross and net wealth per individual was £10,733 and £9,898 respectively, much higher for men than for women. The average financial portfolio was £7,442 for men and £2,981 for women. Of those 508 individuals from the original sample of 1,446, financial investments accounted for more than half (58.6%) of their gross assets, with an even higher percentage for women – 74.6%. Women tended to hold proportionately less real estate and life assurance and have proportionately fewer liabilities. The median statistics, however, show a very wide distribution of asset and portfolio values, with the median gross wealth at £2,298 and the median financial portfolio at £786. Skewness

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<sup>11</sup> Average life expectancy at birth for both men and women born in England and Wales was still less than 50 by 1900. However, these figures reflect high death rates in childhood. See *Longevity Science Advisory Panel* (2012), Paper 2, p. 8, Figure1.

statistics show positive skewness for both men and women, pointing to some very wealthy investors in the sample.

Table 3 explores a possible explanatory factor for variations in wealth or choice of investment asset: the lifecycle. One might expect increasing wealth over time until retirement, with declining wealth thereafter if insufficient income required sale of assets, or if donations were made to charities, heirs, or other interested parties, prior to death (Morris [2005]).<sup>12</sup> The table shows that the wealthiest men and women in the portfolio were over 70, supporting the accumulation of assets hypothesis. The larger portfolios are so substantial that it is likely that income alone provided for the day to day needs of the investors. Those who died under 50 had noticeably less average wealth, supporting the life cycle view. The table also highlights how age at death is less important than gender in explaining variations in the importance of different types of assets in total wealth.

[TABLE 4 NEAR HERE]

Table 4 looks at the types of investment held by men and women across the wealth distribution, in particular gross wealth quartiles and the top 10% and 5% in terms of gross wealth. The table highlights the extreme inequalities in wealth in a sample of individuals already wealthier than average through holding a financial portfolio at death. The average male gross wealth of the lowest quartile was £414, of the top quartile £53,863, and of the top 5%, £132,007. The bottom quartile female wealth was not dissimilar to that of men, at £350, but there were fewer extremely wealthy women, with the top 5% in wealth terms averaging

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<sup>12</sup> During this period, individuals had to save for retirement, especially as ill health might prevent working until death. The aim was to live off income and not sell off assets or securities if at all possible. See Morris (2005).

£40,248. Table 4 also highlights how, for men, the wealthier they were, the higher the proportion of real estate in their gross assets and the lower the importance of cash relative to monies and interest-bearing loans; also, to a lesser extent, the less important the financial portfolio in the gross assets overall. For women, the value of their gross assets has less impact on the importance of each asset class, although women in the first quartile of wealth held proportionately more financial investments and proportionately less real estate than did women in the three, higher quartiles.

[TABLE 5 NEAR HERE]

Table 5 summarises the average and median size of financial portfolios in the sample for the four sub-periods and also shows the total financial portfolio wealth held by the individuals in each sub-period. The greatest amount of wealth was held in the third sub-period, 1887-94, but this period includes the portfolio of Joshua Milne Heap, a widower who died at age 65, leaving a financial portfolio of £260,401. There were relatively more – and relatively more wealthy – women in the fourth sub-period. Five women had portfolios at death of over £12,000 in the period 1895-1902, and the wealthiest, a spinster, Sarah Ann Baxter, who died aged 76, had a portfolio worth £28,678.

Tables 6 and 7 show the sectors held within the financial portfolios, with seven categories as defined in the probate forms to include canals; ships or shares of ships; railway shares; and Other shares.<sup>13</sup> The remaining three sectors were UK, colonial and foreign government stock. As can be seen from Table 6, canal shares and ships or shares of ships were no longer important sectors by the period covered by our sample. The most important sector, 37.9% of

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<sup>13</sup> Note that the probate definitions say ‘shares’ for some categories. They include, however, all types of corporate security, such as debentures, loan stock, preference shares and ordinary shares.

the total, was railways, and this included both UK and non-UK railway company securities. As Mitchell et al. (2011, 811) point out, the railway sector represented fully one quarter of all securities quoted on the London Stock Exchange by the early 1870s, and by the end of the nineteenth century, were regarded as ‘blue chip’ securities. This was in part due to the fact that railway debentures were allowed as eligible securities for any trust fund by the Trust Investment Acts of 1889 and 1893 and this status increased demand to such an extent that eligible railway debentures yielded little more than Consols. However, there is ample evidence of individual investors holding railway securities which were not eligible as Trustee Securities. For example, Mary Cook, a spinster who died at age 69 in 1886 in London, held a financial portfolio worth £20,487 invested entirely in British ordinary and preference shares, with the majority (£10,761) in the Lancashire and Yorkshire Railway. Joshua Milne Heap’s portfolio of £260,401 portfolio with 91 holdings in total, was 60.6% invested in 54 British and non-British railway securities, of which 17.8% by value were ordinary shares, 51.9% preference shares, and 30.2% fixed interest securities. Overall, there is little gender difference in percentage holdings of railway securities.

[TABLES 6 AND 7 NEAR HERE]

The next two sectors by importance are Other shares (30.6%) and Consols (22.6%). Consols decline in relative importance over time, and are marginally more important for women, on average. Men hold increasing amounts of Other shares (a sector which will include commercial and industrial securities as well as utilities) over time, whereas there is no such trend for women. There is, however, a gender preference with respect to overseas government stock; women prefer colonial stock whereas men prefer foreign stock.

Table 7 shows the average size, in market value terms, of the holdings of securities in each of the seven probate sectors. The highest average holding is in UK government stock, £2,791, followed by railway shares (£1,406) and foreign stock (£1,052). There is a downward trend in the average UK government stock holding, possibly reflecting increased supply of other, low risk securities and a search for higher yield. Ignoring the small sectors of ships and canals, the smallest average holding is in non-railway corporate securities, Other shares, at £745. The average holding size appears, in part, therefore, to be linked to risk: the higher the risk, the lower the average holding. In general, women have smaller average holdings than men, partly reflecting their relative lack of wealth. However, when women do have large financial portfolios, they also have higher average holdings, such as in the fourth sub-period when four women each hold more than £9,500 in UK government stock, with spinster Sarah Ann Baxter's £28,678 portfolio at death at age 76 consisting of £27,837 in Consols and less than £1,000 in railway ordinary shares.<sup>14</sup>

[TABLE 8 NEAR HERE]

Table 8 explores this issue further by looking at the number of investors who invested only in relatively low risk securities. The lowest risk security for these investors was UK government stock. In this sample, 9% of men and 14.3% of women held only UK government stock, although this percentage declined over time; by the end of the 19<sup>th</sup> century, only 5.2% of men and 10.2% of women did so. However, if railway securities are also considered low risk (although this category includes ordinary and preference shares as well as debentures) we

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<sup>14</sup> Although canal and shipping shares were not important sectors by the end of the nineteenth century, Table 7 shows women with higher average shareholdings in these sectors in the 1870s. For further discussion of women's investments in ships and canals, see, respectively, Doe (2009) and Hudson (2001).

find that 30.6% of women held portfolios with only railway and UK government securities compared with 17,1% of men. A higher proportion of women also held portfolios made up either of UK and Colonial debt (such as Indian government stock) or of all types of government debt (19.6% and 23.3% of women investors respectively; the comparable figures for men are 10.6% and 14.4%. Thus, proportionately more women than men had lower risk portfolios. This supports Maltby and Rutterford (2006), Rutterford and Maltby (2006), and Rutterford et al. (2011) who argue that this phenomenon can be explained by women's limited range of alternatives (e.g. paid employment) and the need, especially for widows in charge of under age children, to be able to rely on a regular income (Rutterford and Maltby [2007, 315]).

#### **4. Diversification**

As discussed in an earlier section, by the late nineteenth century, the naïve diversification – with equal amounts invested in a number of securities – was being widely disseminated as a standard recommended practise by financial analysts. The suggested number of investments varied from four or five in the 1870s to ten or so by the early twentieth century. Lowenfeld (1907, 85), for example, did make allowance, when determining how many securities to hold, for amount to be invested, suggesting one security once £100 had been accumulated in the Post Office Savings Bank; 2 holdings for £200 saved, and so on up to 5 to 6 holdings for £500 to £1,000; 5 to 7 holdings for £1,000 to £2,000; 6 to 8 for £2,000 to £5,000; 8 to 10 for £5,000 to £20,000; and 10 to 30 holdings for portfolios over £20,000.

Naïve diversification required not just the spreading of risk by holding a number of unrelated securities, but also equal amounts invested in each.<sup>15</sup> We can measure this by what is called the diversification coefficient, which is the sum of the squared portfolio weights, or *SSPW*, as proposed by Goetzmann and Ukhov (2006). This measure identifies unbalanced portfolios. For example, a portfolio invested equally in two securities would have an *SSPW* of 0.5 whereas an unbalanced one invested 90% and 10% in two securities would have an *SSPW* of 0.82. A portfolio following Lowenfeld's recommendation for a global top-down portfolio with ten equal investments would have an *SSPW* of 0.10. Generally, the lower the *SSPW* measure, the greater the level of diversification and the closer to the type of portfolio diversification recommended by financial advice at the time.

A third method of diversification was to invest not just in a random number of securities but in a geographically diversified portfolio. If Lowenfeld's recommendation for a top-down geographic distribution of capital approach, which he elaborated in the early twentieth century, were followed, investors would hold only 10% of their portfolio in UK securities, 10% in the British colonies, and the remaining 80% in foreign securities, a much higher level of international diversification than today. Alternatively, had investors used the mathematical formulation put forward by Markowitz (1952) and known as portfolio theory, using actual return, risk and correlation data from the period 1870 to 1913, Goetzmann and Ukhov (2006) show that the optimal portfolio for an investor over that period would have been one with 63.4% in overseas securities, of which 7.5% were foreign and colonial equities and 55.9% were foreign and colonial debt. However, such an analysis assumes perfect hindsight. There is no reason to believe that investors in 1870 would have been able to perfectly forecast returns and risk for the following 43 years. If, instead, investors had been able to forecast risk

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<sup>15</sup> Indeed, Lowenfeld went further and recommended equal amount in uncorrelated securities, so that losses in one security would be balanced by gains in another (Lowenfeld [1911:79-87]).

and correlations but had assumed that foreign actual returns were the same as the equivalent UK returns, this would have suggested, according to Goetzmann and Ukhov (2006) that British investors should have held just over 20% of their portfolios in overseas securities. These differences highlight the variation in optimal portfolio weights which small changes in data inputs in a Markowitz optimisation can imply.<sup>16</sup> The Lowenfeld approach, with 10% in each region, is more stable.

We now look in turn at these measures of diversification with respect to our sample of investors. Table 9 highlights the number of securities held per portfolio. The average over the whole sample of 508 portfolios was 4.6 securities per portfolio, with 5.6 for men and a lower 3.5 for women. For both men and women the average number of securities held increased over time, with the median number of securities held rising from 2 in the first sub-period to 4 in the last sub-period. While portfolio diversification was a standard practise, significant part of portfolios held fewer than 3 or 4 stocks. Nevertheless, UK investors in the late nineteenth century compared well with recent financial behaviour in the US household sector, in which the median number of stocks held rose to three only after the 2000s (Campbell 2006, 1570).

Table 9 also shows that the diversification coefficient or SSPW of investor portfolios decreased over the four sub-periods, from 0.74 to 0.57, with female investors slightly less diversified than their male counterparts. There is therefore evidence of more balanced portfolios over time, even though many of these investors are likely to have adopted a buy

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<sup>16</sup> These differences highlight the variation in optimal portfolio weights which small changes in data inputs in a Markowitz optimisation can imply. The figures quoted do not allow short selling and also require no more than seven asset classes in any optimal portfolio. The variation in results is in part due to the stellar performance of world railway debt securities during the period, leading to an optimal percentage of around 50% in such securities using actual returns in the optimisation process. Goetzmann and Ukhov (2006:290-296).



and hold strategy which, although holdings might be evenly balanced to start with, would diverge as some securities performed well and others performed badly.

[TABLES 9 AND 10 NEAR HERE]

We now turn to the more sophisticated types of diversification which investors could have adopted in an informal way before the advent of MPT, in particular, diversification across sectors and across countries. If we first look at diversification across sectors, recommended by authors such as Chapman (1908, 27), Crozier (1910) and Lowenfeld (1907), we can see from Table 6 that the investors in our sample did not invest evenly across sectors. Adopting Markowitz's approach to determine the optimal percentage which investors should (using ten years historical data) have invested in both UK and non-UK railway securities combined, Mitchell et al. (2011) found that the optimal percentage in railway securities in a global portfolio was 27.0% in 1884 (the first year calculated), peaked at 58% in 1892, falling back to 32.8% in 1902 (Mitchell [ 2011, 823]). Table 6, column 3, shows the railway holdings, as a percentage of total portfolio value, for the investor portfolios for each sub-period. The railway holdings shows a similar trend to that recommended by Mitchell et al. using ten years' historical risk and return data to estimate optimal railway exposure. The sample's 508 portfolios included the highest amount in railways at the same time as the optimisation using the Markowitz model recommended – 55.1% in 1887-1894 for our sample.

We now consider the extent to which investors in the sample diversified across countries. Table 10 shows the investments in portfolios categorised according to domestic, colonial and foreign corporate and government securities. Over the entire period 1870 to 1902, the average investment in colonial securities was 13.9% and in foreign securities 13.3%. Thus, investors

as a whole did not follow a geographical top-down strategy which involved only one in ten securities being invested in domestic securities, the remainder being invested in overseas securities. It is also worth noting how the emphasis on foreign and colonial securities in the portfolios varied over time, with colonial securities preferred in the first sub-period, foreign securities in the second sub-period, and both equally preferred in the third and fourth sub-periods. As for railways, investors seem to have adopted a more MPT approach to investing overseas, with the 27.2% overseas average closer to an optimal allocation in MPT terms than to a top down geographical distribution of capital.

## **5. Summary and conclusions**

This paper has examined the portfolios of individual investors during the last quarter of the nineteenth century. The main results are that there is evidence of diversification, which both increased over the thirty-two year period under investigation, and also became less unbalanced over time. Men were more diversified than women overall, but not when men and women of equal wealth were compared. Indeed, the wealthier the investor, the more diversified his or her portfolio. Investors preferred railway stocks and Consols to other categories and the geographical diversification recommended by contemporary commentators was indeed undertaken, with an average 27.4% of portfolios value invested outside the UK, of which 13.9% was in colonial securities and 13.3% in foreign securities, and between 21.6% and 55.1% in railway securities. Our findings point to efforts at risk reduction through diversification, even before the full ‘scientific’ approach of the early twentieth century and the Markowitz optimisation approach of the mid-twentieth century.

Analysing the characteristics of portfolios of interest in its own right, as there is extremely limited work done on investor portfolios; rather, research has concentrated on what investors ought to have done, rather than what they did do. Studying these portfolios has enabled us to examine how investor portfolios changed over time, which asset classes investors preferred, and whether there were differences between men and women in their investment choice. This study is also of interest to aid the debate on democratisation, since investors numbers cannot be estimated from the study of share registers without the information relating to how many shares on average individual investors held. Finally, the paper has added to the debate on diversification, in particular, on how investors managed the risk of their portfolios prior to the development of mathematical models such as MPT and the CAPM.

There is evidence of a shift in preference over time, away from the risk-free benchmark of UK government bonds towards more varied and higher yielding securities. Women tended to hold more financial investments as a proportion of total assets than men, but had less wealth overall. Where women did hold substantial portfolios, their investment behaviour did not differ significantly from that of men. In terms of the number of securities held by individual investors, the average for the whole sample of 508 portfolios was 4.6, with a rising trend over time. By 1900, the median figure was 4. And with respect to diversification, there is evidence of this increasing over time – as measured by the number of securities in the portfolio and by the diversification coefficient or SSPW. However, the level of diversification appears closely linked to wealth. As far as geographical diversification is concerned, investors do not appear to have followed the top-down, sectoral or global distribution of assets, which may be due to lack of understanding of this approach (the latter was only widely disseminated after 1905 or so, after several years of poor performance of domestic securities). Instead, investors clearly saw benefits to diversification across sectors (e.g. railways) and across colonial and foreign

securities. This would seem to imply either that investors intuitively understood the concept of correlation and diversification not just naively but across poorly correlated assets, or were following a more CAPM approach, which is to buy in proportion to what is available on the market. Further research should be carried out on how investor portfolios mirrored the opportunity set of securities offered by the London Stock Exchange, that is, the so-called 'market portfolio'.

## **Acknowledgments**

This paper draws upon research undertaken as part of a collaborative research project: ‘Women Investors in England and Wales, 1870-1930’ funded by the UK’s Economic and Social Research Council (Award: Res-000-23-1435). We gratefully acknowledge the support of the collaborators on this project – David Green, Josephine Maltby and Alastair Owens – as well as research assistants Stephen Ainscough, Carien van Mourik and Claire Swan.

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**Table 1.** Age, gender and marital characteristics of the sample.

	Male					Female								
	Obs.	Age at death				Obs.	Age at death				Marital status			
		mean	max	min	stdev		mean	max	min	stdev	single	married	unknown	widow
<b>1870-1878</b>	90	60	92	23	17	65	62	93	15	16	36	3	0	26
<b>1879-1886</b>	54	65	89	24	17	61	67	89	23	16	33	4	2	22
<b>1887-1894</b>	61	65	93	24	18	60	68	90	34	14	37	7	0	16
<b>1895-1902</b>	58	63	86	26	15	59	70	92	39	13	33	2	1	23
<b>Total</b>	263	63	93	23	17	245	67	93	15	15	139	16	3	87

**Notes:** Age at death is available for 457 of 508 investors.

**Table 2.** Total wealth characteristics.

Panel (a): asset categories in £

	mean			median			skewness		
	all	male	female	all	male	female	all	male	female
<b>gross wealth</b>	10,733	15,883	5,205	2,298	3,324	1,762	6	4	4
<b>liabilities</b>	835	1,447	178	46	91	23	8	6	12
<b>net wealth</b>	9,898	14,436	5,027	2,132	2,905	1,692	6	5	4
<b>financial portfolio</b>	5,291	7,442	2,981	786	778	794	10	8	4
<b>real estate</b>	2,319	3,604	941	25	213	0	6	5	11
<b>cash</b>	590	821	341	126	174	90	10	8	8
<b>life assurance</b>	210	393	14	0	0	0	14	10	13
<b>monies and interest due to deceased</b>	1,689	2,554	761	103	144	84	6	5	5

Panel (b): asset categories as % of total wealth

	mean			median			skewness		
	all	male	female	all	male	female	all	male	female
<b>liabilities</b>	10.5	13.0	7.9	1.6	2.1	0.9	12.0	5.1	13.4
<b>net wealth</b>	89.5	87.0	92.1	98.4	97.9	99.1	-12.0	-5.1	-13.4
<b>financial portfolio</b>	58.6	43.8	74.6	53.8	42.8	63.7	21.5	0.2	15.3
<b>real estate</b>	17.0	20.9	12.9	1.4	6.0	0.0	1.5	1.2	1.9
<b>cash</b>	9.5	9.7	9.4	3.9	3.8	3.9	2.6	2.9	2.1
<b>life assurance</b>	1.9	3.4	0.3	0.0	0.0	0.0	6.4	4.7	10.8
<b>monies and interest due to deceased</b>	13.6	11.9	15.4	3.5	3.2	3.8	1.9	1.8	1.8

**Note:** All values are in £. Financial portfolios include all liquid securities other than cash: that is, both equity (ordinary and preferred shares) and debt (debentures or Consols). *Cash* is a proxy of general cash savings including any type of cash in the house, in the bank, in the office or anywhere else. The category *monies and interest due to deceased* includes different types of debt (i.e. rents, mortgages, bonds and bills, and book debts) and the related interest payments owed to investors at the time of death. The *gross wealth* is the gross estate. It includes: monies and interest due to deceased, real estate, portfolio (all financial stocks), life assurance, cash and the sum of chattels (this one is not reported in the table). The *net wealth* is equal to gross wealth minus total *liabilities*. The latter comprises all debts (ordinary debts, mortgages and bonds and bills) and related interest payments owed by the deceased.

**Table 3.** Distribution of wealth by age at death.

	age*														
	under 40		40-49		50-59		60-69		70-79		over 80		All		
	male	female	male	female	male	female	male	female	male	female	male	female	male	female	
No. of observations	26	8	26	22	32	37	60	44	52	62	41	47	237	220	
gross wealth averages (£)	2,526	1,341	4,911	1,663	7,489	3,334	13,960	4,607	22,605	6,901	28,168	6,749	15,883	5,205	
<b>share of different asset categories as % of gross wealth</b>															
real Estate	17.5	30.0	19.8	13.0	26.2	10.7	19.4	13.3	18.0	14.2	23.7	12.2	20.9	12.9	
cash	14.4	1.4	12.3	10.4	5.5	10.2	10.5	9.7	10.3	8.7	9.1	8.7	9.7	9.4	
life assurance	4.8	0.5	5.1	0.0	3.1	1.2	2.3	0.2	2.5	0.1	1.9	0.0	3.4	0.3	
monies and interest due to deceased	6.7	7.3	8.8	16.6	12.4	18.8	11.9	19.2	15.7	14.7	11.3	13.9	11.9	15.4	
financial portfolio	45.5	57.1	35.3	53.3	33.2	51.1	47.0	55.2	45.0	60.4	48.1	61.9	43.8	58.2	

**Notes:** Age at death is available for 457 of 508 investors.

**Table 4.** Distribution of wealth by asset class.

	Wealth quartile				top 10%	top 5%	All
	I	II	III	IV			
<b>Male</b>							
gross wealth averages (£)	414	1,831	7,189	53,863	95,768	132,007	15,883
<i>share of different asset categories as % of gross wealth</i>							
real Estate	12.2	27.5	22.4	21.4	27.7	35.3	20.9
cash	15.3	11.0	7.8	4.8	5.4	4.0	9.7
life assurance	2.8	4.4	4.1	2.3	2.3	1.5	3.4
monies and interest due to deceased	6.0	10.6	14.7	16.1	17.0	18.2	11.9
financial portfolio	48.4	36.2	40.6	49.8	41.9	33.1	43.8
<b>Female</b>							
gross wealth averages (£)	350	1,117	3,122	16,055	27,991	40,248	5,205
<i>share of different asset categories as % of gross wealth</i>							
real Estate	5.2	12.6	16.5	17.1	12.6	17.3	12.9
cash	11.0	10.8	9.6	6.1	6.6	7.3	9.4
life assurance	0.2	0.2	0.3	0.6	0.2	0.0	0.3
monies and interest due to deceased	13.3	17.8	16.1	14.4	11.9	14.1	15.4
financial portfolio	67.3	53.6	54.0	57.7	64.6	59.9	58.2

**Table 5.** Average, median and total values of financial portfolios per sub period.

decade	number of individuals	average portfolio value (£)	median portfolio value (£)	Total financial portfolio wealth (£'000)
<b>All</b>				
<b>1870-1878</b>	155	4,304	385	667
<b>1879-1886</b>	115	4,565	629	525
<b>1887-1894</b>	121	8,082	1,084	978
<b>1895-1902</b>	117	4,425	1,677	518
<b>Total</b>	508	5,291	786	2,688
<b>Women</b>				
<b>1870-1878</b>	65	1,738	282	113
<b>1879-1886</b>	61	3,196	689	195
<b>1887-1894</b>	60	3,037	1,031	182
<b>1895-1902</b>	59	4,073	1,916	240
<b>Total</b>	245	2,981	794	730
<b>Men</b>				
<b>1870-1878</b>	90	6,158	597	554
<b>1879-1886</b>	54	6,110	510	330
<b>1887-1894</b>	61	13,045	1,752	796
<b>1895-1902</b>	58	4,782	930	277
<b>Total</b>	263	7,442	778	1,957

**Table 6.** Holdings in market value by sub-period and probate type.

	Canal Shares	Other Shares	Railway Shares	Ships or Shares of Ships	Colonial stock	Foreign stock	UK Stock	Total
<b>All</b>								
<b>1870-1878</b>	0.6	26.9	21.6	0.6	1.0	4.0	45.2	100.0
<b>1879-1886</b>	0.8	31.3	32.3	0.9	2.9	8.4	23.5	100.0
<b>1887-1894</b>	0.2	31.1	55.1	0.1	4.2	2.8	6.4	100.0
<b>1895-1902</b>	0.5	33.7	32.2	0.6	6.7	3.1	23.3	100.0
<b>Total</b>	0.5	30.6	37.9	0.5	3.6	4.3	22.6	100.0
<b>Women</b>								
<b>1870-1878</b>	1.8	39.4	23.7	1.2	1.7	2.0	30.2	100.0
<b>1879-1886</b>	0.9	21.1	43.8	0.1	3.2	0.9	29.9	100.0
<b>1887-1894</b>	0.0	22.7	35.0	0.0	16.8	10.6	14.9	100.0
<b>1895-1902</b>	0.0	24.6	30.4	1.2	7.3	1.0	35.5	100.0
<b>Total</b>	0.5	25.5	34.1	0.6	7.7	3.5	28.1	100.0
<b>Men</b>								
<b>1870-1878</b>	0.4	24.3	21.2	0.5	0.9	4.4	48.3	100.0
<b>1879-1886</b>	0.7	37.3	25.4	1.4	2.7	12.8	19.7	100.0
<b>1887-1894</b>	0.2	33.1	59.7	0.1	1.3	1.1	4.5	100.0
<b>1895-1902</b>	1.0	41.5	33.8	0.0	6.1	4.9	12.7	100.0
<b>Total</b>	0.4	32.5	39.4	0.4	2.1	4.5	20.6	100.0

**Table 7.** Average market value of holdings by sub-period and probate type.

	Canal Shares	Other Shares	Railway Shares	Ships or Shares of Ships	Colonial stock	Foreign stock	UK Stock	Total
<b>All</b>								
<b>1870-1878</b>	362	854	1,118	332	970	768	3,548	1,362
<b>1879-1886</b>	448	928	1,210	1,528	891	1,521	2,469	1,235
<b>1887-1894</b>	577	937	1,898	219	909	1,114	1,614	1,347
<b>1895-1902</b>	676	445	970	478	938	792	2,736	767
<b>Total</b>	461	745	1,406	477	920	1,052	2,791	1,161
<b>Women</b>								
<b>1870-1878</b>	497	655	724	672	963	250	923	710
<b>1879-1886</b>	351	763	1,155	120	777	300	1,769	1,077
<b>1887-1894</b>		430	1,082		985	1,287	1,237	817
<b>1895-1902</b>	11	387	1,029	478	767	386	3,043	834
<b>Total</b>	376	502	1,034	482	880	713	1,708	858
<b>Men</b>								
<b>1870-1878</b>	285	949	1,277	271	972	948	5,572	1,674
<b>1879-1886</b>	568	1,000	1,271	2,232	992	1,839	3,828	1,352
<b>1887-1894</b>	577	1,149	2,112	219	741	855	2,103	1,582
<b>1895-1902</b>	898	481	929		1,218	966	2,199	717
<b>Total</b>	511	868	1,592	474	981	1,219	4,117	1,336

**Table 8.** Proportion of low risk investors by sub-period.

	UK government		UK government plus Railways		UK plus Colonial government debt		Government debt		Number of obs.	
	male	female	male	female	male	female	male	female	male	female
<b>1870-1878</b>	10.0	16.9	21.1	38.5	13.3	20.0	17.8	26.2	90	65
<b>1879-1886</b>	13.0	19.7	18.5	39.3	13.0	24.6	18.5	27.9	54	61
<b>1887-1894</b>	8.2	10.0	18.0	21.7	8.2	18.3	13.1	23.3	61	60
<b>1895-1902</b>	5.2	10.2	8.6	22.0	6.9	15.3	6.9	15.3	58	59
<b>All</b>	9.1	14.3	17.1	30.6	10.6	19.6	14.4	23.3	263	245



**Table 9.** Diversification measures by sub-period.

decade	number of individuals	average number of securities	median number of securities	SSPW
<b>All</b>				
<b>1870-1878</b>	155	3.2	2	0.74
<b>1879-1886</b>	115	3.7	2	0.70
<b>1887-1894</b>	121	6.0	3	0.61
<b>1895-1902</b>	117	5.8	4	0.57
<b>Total</b>	508	4.6	2	0.66
<b>Female</b>				
<b>1870-1878</b>	65	2.4	1	0.79
<b>1879-1886</b>	61	3.0	2	0.72
<b>1887-1894</b>	60	3.7	3	0.63
<b>1895-1902</b>	59	4.9	4	0.59
<b>Total</b>	245	3.5	2	0.68
<b>Male</b>				
<b>1870-1878</b>	90	3.7	2	0.70
<b>1879-1886</b>	54	4.5	2	0.68
<b>1887-1894</b>	61	8.2	3	0.59
<b>1895-1902</b>	58	6.7	4	0.54
<b>Total</b>	263	5.6	2	0.64

**Table 10.** International diversification by sub-period.

	<b>1870-1878</b>	<b>1879-1886</b>	<b>1887-1894</b>	<b>1895-1902</b>	<b>Total</b>
<b>no. of observations</b>	155	115	121	117	508
<b>Total financial portfolio wealth (£)</b>	667,187	524,918	977,969	517,670	2,687,744
<b>proportion of total financial portfolio wealth (%)</b>					
<b>UK government</b>	32.2	24.1	11.6	27.0	22.1
<b>UK corporate</b>	40.1	50.4	62.4	41.5	50.5
<b>UK securities</b>	72.3	74.5	74.0	68.5	72.6
<b>Colonial government</b>	14.4	2.3	5.3	8.8	7.6
<b>Colonial corporate</b>	6.0	4.7	6.9	7.0	6.3
<b>Colonial securities</b>	20.4	7.0	12.2	15.8	13.9
<b>Foreign government</b>	4.3	10.0	3.2	3.4	4.8
<b>Foreign corporate</b>	3.0	8.0	10.6	12.0	8.5
<b>Foreign securities</b>	7.3	18.0	13.8	15.3	13.3