KEYNES THE STOCK MARKET INVESTOR *

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Abstract: Keynes made a major contribution to the development of professional asset management. Combining archival research with modern investment analysis, we evaluate John Maynard Keynes' investment philosophy, strategies, and trading record, principally in the context of the King's College, Cambridge, endowment. His portfolios were idiosyncratic and his approach unconventional. He was a leader among institutional investors in making a substantial allocation to the new asset class, equities. Furthermore, we document a radical change in Keynes' approach to investment which was to the considerable benefit of subsequent performance. Keynes' experiences in managing the endowment remain of great relevance to investors today.

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1. Introduction

John Maynard Keynes' many writings on the stock market are well known. Chapter 12 of *The General Theory* discussed at length the influence of the stock market on the macro-economy. His observations on the "animal spirits" of the market continue to inspire behavioral economists up to the present (Akerlof and Shiller, 2009), to invite studies of the role of investor sentiment in anomalous stock returns (Stambaugh, Yu, and Yuan, 2012) and to anticipate explanations for modern stock market bubbles (Greenwood and Nagel, 2009). Such modern investment giants as Warren Buffett (1986–2005), George Soros (1987, 2011), and David Swensen (2001, 2007) have invoked Keynes in support of their investment beliefs and strategies on numerous occasions. Stories of share-dealing from his bed and the need to fill up King's College Chapel with grain as a result of his commodity dealing have become legend.

The most overlooked of Keynes' many accomplishments is that he was among the first institutional managers to allocate the majority of his portfolio to the new alternative asset class of equities. At the end of the 20th century both British and American long-term institutional investors had the majority of their assets invested in equities, public and private. In contrast, their ancestors one hundred years earlier regarded common stocks (ordinary shares) as extremely risky and shunned this asset class in favour of fixed income and real estate.

Keynes, on the other hand, revolutionised the way his Cambridge college endowment was managed. As a bursar appointed shortly after the end of WW1, he was allowed great discretion by the College Fellows in managing these funds from 1921 until his death in 1946. In committing his Cambridge college portfolios to equities where he

was free so to do, he exploited the risk premium available to long-term investors over conventional fixed income assets – a premium that was to emerge over the remainder of the last century (Jorion and Goetzmann, 1999). Yet Keynes' investment record has been dealt with only cursorily in the literature.

In *The Collected Writings of John Maynard Keynes* ("CWK"), Moggridge (1982) reviewed Keynes' investment activities, and suggested he was a star investor. Skidelsky (1983, 1992, 2000, 2005, and 2009), Westall (1992), Mini (1995), Backhouse and Bateman (2006), Walsh (2007) and Clarke (2009) discuss Keynes' investment prowess, and Fantacci, Marcuzzo, and Sanfilippo (2010) analyse Keynes' 1937 investment in wheat futures. However, the only quantitative study of Keynes' stock market performance is Chua and Woodward's (1983) analysis of annual endowment returns in a study that suffers from considerable data and methodological problems (see Section 3.2).

An almost complete record of Keynes' trading has until now remained dormant in the King's College Archives; see Cox (1995). Lawlor's (1995) conclusion that, since Moggridge, "*no comprehensive study has ever been made of the records in the Keynes papers relating to his investment activity*" remains valid to the present day. The Archives provide the security holdings and transactions which we use to reconstruct Keynes' investment decision-making. As a result, we are able to look in detail at Keynes' trading performance. Having started out as a strategic macro manager, we show that Keynes changed into a bottom-up stock picker in the early 1930s, from which point his purchases of his long-term holdings began to outperform the market on a consistent basis.

We show that he constructed highly idiosyncratic portfolios with pronounced size and value tilts and in so doing anticipated strategies employed by the better performing

institutional investors in the modern period (Lewellen, 2011). A study of Keynes the investor is therefore important because his investment record demonstrates early confidence in an equity risk premium and development of small stock and value investment strategies which have been defined retrospectively by modern research. Keynes provides us with an “out-of-sample” case study of a major investor employing these strategies over a quarter of a century.

The study also links to several areas of recent research. Firstly, several studies have claimed that there is a tendency for investors to exhibit overconfidence and as a result to trade excessively to the detriment of performance both in individual stocks (Odean, 1999, and Barber and Odean, 1999) and in mutual funds (Bailey, Kumar, and Ng, 2011). As a young man, Keynes was supremely self-assured about his capabilities, and he traded most actively to the detriment of performance in the first period of his stewardship of the College endowment up to the early 1930s. During this earlier period, the post-transaction performance of his purchases, measured relative to the market, was a one-year underperformance of –5.3%. In the later period, however, the one-year performance of his purchases substantially improved, to beat the market by +5.4%.

Focussing on Keynes the institutional investor reinforces what has recently been discovered about the characteristics associated with successful fund managers, namely, age, education, intellect, and social networks (Chevalier and Ellison, 1999a and 1999b; Cohen, Frazzini, and Malloy, 2008; Grinblatt, Keloharju, and Linnainmaa, 2012). These were all characteristics that made Keynes a talented investor. Organisation is also important in encouraging investment talent. Solo fund managers typically outperform a team of fund managers because they process soft information more easily and hold a

less conventional portfolio (Chen, Hong, Huang, and Kubik, 2004). Keynes benefitted from the right organisational set-up at his college where he enjoyed the full confidence of his Fellows in taking investment decisions. As a result, he was given a free hand to trade extensively in equities, to construct a highly idiosyncratic portfolio to the eventual benefit of performance, and to change his investment approach when necessary.

The paper is organised as follows. Section 2 reviews Keynes' investment activities and, in particular, his duties at King's College. Section 3 describes the data. Section 4 reviews Keynes the investment innovator and describes his active approach to equity investing. Section 5 analyses his trading record over the entire 25 years he invested in equities for the King's endowment. Section 6 discusses our main findings and Section 7 concludes.

2. Keynes' investment activities

Investment played an important part in Keynes' life. When an undergraduate, he had written in 1905 to his friend, Lytton Strachey, "*I want to manage a railway or organise a Trust, or at least swindle the investing public; it is so easy and fascinating to master the principles of these things*" (Moggridge, 1992: 95). He was to become an extremely active personal investor, as well as fulfilling investment roles at several institutions, including most importantly the National Mutual Life Assurance Society (1919–38), the Provincial Insurance Company (1923–46), and King's College, Cambridge (1919–46) (CWK XII: 1).

As chairman, Keynes exerted a strong influence on investment policy at the National Mutual but his views were frequently challenged by other board members. Even at the smaller Provincial, Keynes warned the company's chairman that after experiencing "*succe[ss] in persuading the Board rather against its better judgement in the first*

instance…[one could] suffer the penalty of their faint-heartedness at a later date" (CWK XII: 65).

Keynes appears not to have encountered any of these problems at King's. In 1911 he had been elected to the Estates Committee, and in 1912 to the Council, the governing body of King's College. Appointed Second Bursar just after WW1, he had primary responsibility for investments from 1921; and from 1924 as First Bursar, he had full discretion over investment policy until his death in 1946. There seems little doubt that within the College his investment policy went unchallenged. His knowledge and experience of financial markets invited the confidence of his Fellows and his annual "Chancellor of the Exchequer" speech became a not-to-be-missed fixture in the College calendar.

Oxford and Cambridge ("Oxbridge") colleges are the ultimate long-horizon investors and King's, founded in 1441, was by no means the oldest. The colleges have a natural concern for preserving their wealth for future generations (Tobin, 1974). Traditionally, their assets were largely invested in real estate (Dunbabin, 1975; Acharya and Dimson, 2007) and a college bursar collected the rents from a predominantly agricultural portfolio, managed the expenditures, and drew up the college books (Neild, 2008: 100).

The King's endowment was run as a collection of separate accounts. An internal annual investment review of the College endowment, entitled *Report to the Inspectors,* was drawn up shortly after the August financial year-end and dealt with each of these accounts. The market value of all securities held by the College grew from GBP 285,000 in 1921 to GBP 1,252,000 in 1946 at nominal prices (unadjusted for inflation) through a

combination of investment performance and cash inflows.

During Keynes' time all Oxbridge Colleges were still subject to the Trustee Acts which dated from the mid-19th century (the Universities and College Estates Act, 1925, ch.26 (1)(i)). Intended to ensure that any trust funds were managed conservatively, the Acts together with college statutes severely restricted the ability of a bursar to undertake financial investments primarily to such high quality fixed income securities as UK and colonial government securities, UK railway securities, water company securities and local authority housing bonds and mortgages (*Stock Exchange Official Intelligence* 1926, p.1922–23). Furthermore, Oxbridge colleges chose to follow these restrictions in the case of both corporate and trust funds.

Keynes exerted his influence most decisively in 1921 by persuading his College Fellows to permit a part of the endowment to be excluded from the onerous Trustee Act restrictions. He was aided in this strategic decision by the fact that his college statutes were loosely drawn (Moggridge, 1992: 352). The endowment can therefore be divided into funds subject to the Trustee Acts ("Restricted Portfolio") and those which were not and where Keynes had full discretion ("Discretionary Portfolio"). The Discretionary Portfolio grew from 8% to 68% of the total securities held between 1921 and 1946. These funds comprised the Chest alone up to 1933, and thereafter the Chest and Fund B together. The Chest started in the financial year ended August 1921 and Fund B was created in September 1933 as a pooled vehicle for a myriad of small endowed funds which had previously been managed on a segregated basis. The two accounts were managed in a similar style, the UK security holdings in the Chest representing in excess of 50% of Fund B throughout the period. Hence, although attention has tended to

concentrate on the Chest, we look at Keynes' trading record for both these discretionary accounts.

Keynes also actively managed his own money. This trading record is more challenging to piece together than that of his college. However, he appeared to manage his own and King's money in a similar way. Our comparison of his UK equity holdings within the King's Discretionary Portfolio at each December year-end across the entire period reveals that 77% by value (and 66% by number) of his personal holdings were also held by King's.

Hence, the great attraction in analysing the King's College endowment, and the Discretionary Portfolio in particular, lies in it being the purest expression of Keynes' views and skill in an institutional investment context. Given free reign, how much was he prepared to allocate to the risky new asset class of common stocks, and in what sort of securities did he invest? What investment rules or process did he follow? Finally, how successfully did he trade equities?

3. New data and prior evidence

In this section we describe the data that underpins this study, and summarise prior evidence on Keynes' investment performance. First we explain the archival sources for our data and the financial market data we have used, and present some summary information. We then review prior evidence on the performance of the King's College endowment, and draw comparisons with an earlier study that reported summary performance statistics for one of the funds managed by Keynes.

3.1 King's investment records

Annual investment reports of the King's endowment, including lists of security

holdings, are kept in the King's College Archives for each financial year-ended August from 1921 until 1946, with only the 1926 Report missing. In addition, transaction records covering the same period were also consulted. King's, like many Oxbridge colleges, was a large real estate owner. Neild (2008) provides historical data on Cambridge colleges' external income from investments, including real estate. By 1939, the income of King's College was second only to Trinity College, and the value of the King's College security portfolio was almost certainly higher than any other college. However, the only disclosures regarding real estate are rents received. Valuations were not undertaken during Keynes' time, nor is there any mention of such in the investment reports. Consequently, all figures presented below exclude real estate.

UK security prices were collected from the *Stock Exchange Daily Official List*. Capital and dividend histories are taken from the *Stock Exchange Official Yearbooks*. Individual security prices are end-of-month closing mid-market prices, the exceptions being *Supplementary List* securities before 1933, where the average of the daily high and low is taken.

For benchmark purposes we employ the equally-weighted 100 Share UK equity index series estimated by Dimson, Marsh, and Staunton (DMS, 2002), which is representative of the sectoral composition of the broad market and includes natural resource stocks as well as commercial and industrial companies. Intra-year DMS index values are inferred from monthly fluctuations in the *London and Cambridge Economic Service* (LCES) 20 Share Index up to 1929, the *Financial News* (FN) 30 Share Index from 1930 to June 1935, and the *Financial Times* (FT) 30 Share Index from July 1935 onward. To do this, we compute for each year the gain or loss of the DMS index relative to the

LCES, FN or FT index. We use this estimate of abnormal performance to calculate monthly capital appreciation consistent with the DMS 100 Share index. Monthly dividend income is estimated as one-twelfth of the annual dividends reported by DMS. Our UK government bond and cash indexes are respectively the total return on UK Consols and UK Treasury Bill returns (DMS, 2002, 2012).

As discussed in the previous section, our analysis focuses on Keynes' trading of publically traded UK stocks in the Discretionary Portfolio. **Table 1** summarises his 1019 transactions (608 buys and 411 sells) undertaken for all financial years between 1921 and 1946. 961 transactions were made for the Discretionary Portfolio and a further 58 equity transactions were for other accounts before they co-mingled their stock holdings in Fund B at the end of August 1933. We have excluded stock transactions due to: the stock not being listed in London (29); absence of the transaction date in the financial years 1921 (20), 1922 (1) and 1923 (5); inadequate disclosure regarding the terms of rights issues (11); and misbooking of transaction price (1) or date (1). There are 196 instances where purchase (sell) trades are executed in a stock which has also been purchased (sold) on another day in the same calendar month. Since we are dealing with monthly frequency price data, in each of these instances we consolidate the purchases (sales) into a single trade to arrive at the 1019 transactions in Table 1. In the analysis below, our results are reported on this set of transactions; however, our findings are robust to using the unconsolidated 1215 transactions.

In total, Keynes bought equities costing GBP 1,165,000 and sold equities to the value of GBP 796,000. The sizes of his buy and sell transactions were on average very similar at a little below GBP 2,000. We define turnover as the average of purchases and

sales in a given financial year, divided by the average UK equity portfolio value over that year. His most active year of trading by value was 1934–35, when he turned over GBP 158,000 of securities. To put these amounts in context, GBP 1 invested at the start of 1935 in equities would by the start of 2012 have been worth GBP 124 in capital terms or GBP 3,577 with dividends reinvested; see DMS (2012). The right-hand column of Table 1 reports the annual turnover figures for the UK equity portfolio. Turnover showed a downward trend, averaging 55% in 1921–29, 30% in 1930–39, and 14% in 1940–46.

An analysis of the distribution of his trading by calendar month does not suggest that he engaged in window-dressing. 8.1% of his trades occurred in July and August, the closing months of the financial year, as compared to an average of 8.4% in the other ten months.

Figure 1 displays the steady increase in the average number of UK equity holdings from 19 as the Discretionary Portfolio grew in size, peaking at 72 in 1942 before declining again to 59 in Keynes' final year. We also graph various portfolio concentration measures: the proportion of the market value of the Discretionary Portfolio's UK equity securities allocated to the largest holding (C1), the largest five (C5) or the largest twenty (C20) shareholdings. The C20 measure declined steadily throughout the period. The C1 (C5) annual averages rose from 15% (46%) in 1921–29 to 21% (49%) in 1930–39, and then fell back to 11% (33%) in 1940–46. The effective level of diversification is measured by Sharpe's (1970) D (the reciprocal of the Herfindahl index of individual equity weights), plotted as black bars alongside the total number of equities plotted as unshaded bars. Keynes initially held an almost equally-weighted portfolio and so D is at first close to the number of equities. Over time the Discretionary Portfolio became less balanced and so

the effective diversification, as measured by D, was lower than the number of equities might suggest.

3.2 King's performance statistics

The only prior statistics on Keynes' performance were estimated in Moggridge (CWK XII: 91, Table 7) and analysed by Chua and Woodward (1983), whose analysis suggested that Keynes was an extreme performer, with an annualised alpha of 14.5%. However, this study is based on price-only returns; it measures the performance of a single discretionary account (The Chest) within the King's endowment; the returns series does not begin until the financial year 1928; and the benchmark (the Bankers Magazine index) is unsuitable for performance measurement. In particular, the Bankers Magazine index is biased against "speculative" securities (Grant, 1967, p.135), has an unusually low beta and volatility (White, 1990, Fig.6), has no defined index management rules, provides no indication of appropriate adjustments for rights issues, omits dividend yield, and is calculated only at mid-month. We address these issues by estimating total returns beginning in the first full financial year in which Keynes invested in equities, 1921–22, for a composite of both accounts within the endowment where he had full discretion, namely The Chest and Fund B, and benchmarking performance against the equally-weighted DMS 100 Share UK equity index.

We revisit Keynes' performance by taking information from his annual investment review of the College endowment, the *Reports to the Inspectors*, which he prepared from 1922 until his death. These reports were not for distribution outside the Estates Committee. The endowment consisted of a number of separate accounts reflecting the different investment guidelines and constraints each faced. The *Reports* strongly suggest

that each account was managed on a segregated basis, with Keynes separately reviewing each of the four main accounts which made up the Restricted Portfolio and the two accounts making up the Discretionary Portfolio. For each, he provided segregated lists of year-end holdings at market values as well as annual capital appreciation and income figures. As discussed above, the distinction between account types was particularly crucial for investment policy and asset allocation since Keynes enjoyed the greatest freedom of investment choice in the case of the Discretionary Portfolio.

From the *Reports to the Inspectors*, we have calculated the returns for the Discretionary Portfolio (taking The Chest and Fund B together), the Restricted Portfolio, and the Total Fund excluding real estate, summarised in **Table 2.** (The Discretionary Portfolio returns also include a third fund, Fund C, established in 1933, which on average represented less than 1% of the total market value of the assets we analyse.) The returns are based on the estimates made by Keynes of the appreciation or depreciation for each year as a percentage of the start-year market value. To this capital gain or loss is added the income return for the year which is the reported investment income divided by the average of the beginning and end portfolio values. As a general rule all endowment income was spent by the College rather than retained in the endowment.

According to these estimates, over the whole period from end August 1922 to end August 1946, the annual performance of the Discretionary Portfolio averaged +15.97%, as compared to +10.37% for the equally-weighted UK equity market index. Compared to Chua and Woodward's estimated Jensen's alpha of 14.45% and a market beta of 1.78 using the single market model, we obtain much lower figures of 7.74% and 0.79 respectively. Whilst these summary statistics suggest the Discretionary Portfolio did well,

the Restricted Portfolio generated an annual arithmetic mean total return of only +6.81%, which did not compare favourably with total returns to UK government bonds of +7.06%.

The Sharpe Ratio of 0.73 for the Discretionary Portfolio compares favourably with those for the Restricted Portfolio (0.57) and the UK equity market (0.49). Keynes' tracking error versus the UK equity index is 13.9%, a substantial active risk compared to the typical portfolio today. According to Brown, Dimmock, Kang, and Weisbenner (2010), the time series tracking error for contemporary US university endowment funds averaged 3.4% over the period 2002–07 and the tracking error of the 95th percentile fund in the study still only reached 6.3%.[1] The high tracking error of Keynes' fund was attributable to his idiosyncratic stock selection, a subject we take up in the next section, as well as quite possibly to his US equity exposure after 1930.

Examination of the annual time-series of Discretionary Portfolio returns in Table 2, column (1), shows that whilst Keynes underperformed in only six out of the 25 financial years, three of those underperforming years were 1926, 1927, and 1928 when UK equities put in a strong performance. Furthermore, he failed to foresee the sharp fall in equities after September 1929 and to avoid a decline of 14.2% in the financial year 1930, by which time he was a cumulative 12.6% behind the equally-weighted equity benchmark since inception and 40.3% behind over a trailing period of five years. We return to the significance of this period of underperformance in the following section. After this point, the Discretionary Portfolio only experienced substantial underperformance in the financial year 1938 and were never behind the UK equity market benchmark on either a rolling three-year or five-year basis.

[1] We are grateful to Stephen Dimmock for providing this estimate.

4. Keynes the investment innovator

Keynes' great insight was to appreciate the previously overlooked attractions of a new asset class for long-term investors, namely equities. In this section we start with the case for equities as the (then) new asset class for endowments and long-horizon investors, and review the impact on investment performance of Keynes' decision to emphasize equities. We next describe the evolution of Keynes' investment philosophy and then we examine characteristics such as sector weightings, the size of companies held in the portfolio, and their dividend yields. Last, we analyse the return contribution of the winners and losers in the Discretionary Portfolio and comment on his approach to security selection.

4.1 The case for equities

Keynes began moving King's into equities in 1921. Several years later in 1925, he wrote a very positive review of Smith (1924), in which he extolled the virtues of US common stocks as residual claims on industrial growth (Keynes, 1925). Based on the US experience, Keynes foresaw the same potential in UK ordinary shares as in US common stocks and listed their attractions as promising a return premium over bonds, providing "an investment in real values" (ibid.) and as offering an income premium over bonds. We discuss each of these in turn.

History proved Keynes' prediction of a positive equity risk premium to be correct. During 1900–1920 prior to Keynes' decision to begin switching King's into equities, the annualised UK equity risk premium over Treasury Bills had been only 0.3%. The risk premium rose to 4.9% during 1921–1946, the period during which he moved King's into equities. It was to increase further to 6.8% from the year of his death to the end of the

century (DMS, 2002). Although UK equities had failed to generate a real return (–1.6%) during 1900–20 when the annualised inflation rate was 5.6%, they returned +8.3% over 1921–46 when there was deflation (–1.1%). Over the remainder of the century, when annualised inflation ran at 6.1%, equities continued to generate strong real returns (+7.9%).

In making such a large allocation to equities, Keynes fully appreciated that the King's endowment gave up nothing in terms of income and that therefore his investment policy would not have an adverse impact on spending policy. The College's dividend yield on its UK equity portfolio averaged 6.0% across 1921–29, above the dividend yield on the UK equity market of 5.2% and the income return on government bonds of 4.6%. During 1930–39, the College's dividend yield on the UK equity holdings averaged 5.9%, again exceeding the 4.4% dividend yield on the UK equity market and the 3.4% income return on government bonds. During 1940–46, the College's UK equity holdings enjoyed a 5.8% dividend yield, which was again higher than the UK equity market's 4.0% dividend yield and the 3.0% income return on government bonds. In all periods, the average dividend yield for King's includes non-dividend paying security holdings.

Keynes backed his judgement and aggressively shifted into ordinary shares at the earliest opportunity. The UK ordinary share weighting of the Discretionary Portfolio averaged 75% over the financial years 1922–29, 46% over 1930–39, and 69% over 1940–46. In the 1930s, Keynes started buying US common and preference stocks. Adding in US common stock his total ordinary share and common stock weighting averaged 57% over 1930–39 and 73% over 1940–46. In contrast, the equity weighting of King's Restricted Portfolio averaged only 1% across the period 1921–46 and from 1933

onwards there were no ordinary share holdings due to the predominance of high quality fixed income securities under the law as discussed in Section 2 above.

Although Keynes briefly sought refuge for the Discretionary Portfolio in UK government securities in the early 1930s following the fall in UK share prices, the main balance of funds were invested in UK preference shares (1922–29 12%, 1930–39 10%, and 1940–46 15%). In an era when preference shares were much more common than today, we include both ordinary and preference shares in the analysis which follows.

During Keynes' time in office, other Oxbridge colleges had yet to diversify their endowments into equities. The largest Cambridge colleges, Trinity and St. Johns, only amended their statutes to permit equity investment after WW2 (Neild, 2008, p.122, and Moggridge, 1992, p.352). Although the largest US university endowments had committed more to common stocks, this allocation on a historical cost-weighted basis remained below 10% in the 1920s and only rose above 20% in the late 1930s (Goetzmann, Griswold, and Tseng, 2010).

Albeit with far less discretion, Keynes led a similar shift into equities at the National Mutual, considerably more so than any other insurer (Scott, 2002). Overall, the major UK institutions, comprising pension funds, investment trusts and insurance companies, also largely eschewed equities in favour of fixed income securities in this period (Hannah, 1986; Burton and Corner, 1968; Baker and Collins, 2003). Keynes' portfolio was also very different from highly regarded US investors. For example, Dean Mathey (1966), the remarkably successful chairman of Princeton's investment committee, switched heavily into bonds in the late 1920s and kept out of equities until midway through WW2.

In summary, the stock market had been the territory of the individual investor, and

equities were rarely perceived as an institutional asset. Keynes spotted an opportunity for patient, long-term investors and his early allocation to equities was at least as radical as the much later move by Mathey or the commitment to illiquid assets in the late 20th century by Yale and Harvard. Keynes' asset mix is consistent with the implications of standard models of consumption and portfolio choice that were to appear many decades later, as described, for example, by Campbell and Viceira (2002). Keynes can justly be regarded as among the first institutional equity investors.

4.2 Investment philosophy

Keynes started out with a top-down investment philosophy. In the prospectus of the Independent Investment Company, a closed-end fund co-founded by Keynes and floated on the London Stock Exchange in 1924, his approach was described as the "credit cycle theory of investment" (CWK XII: 33). As an originator of the *London and Cambridge Economic Service*, he favored using monetary and economic indicators to underpin switching between equities, fixed income, and cash. Keynes adopted this same philosophy in managing the College funds (CWK XII: 106).

However, as we saw in the previous section, performance in the late 1920s was disappointing and he discarded his top-down philosophy in favour of a bottom-up approach. When subsequently reflecting on his investment record for King's, Keynes confessed that: *"We have not proved able to take much advantage of a general systematic movement out of and into ordinary shares as a whole at different phases of the trade cycle"* (CWK XII: 106). The difficulty he felt he faced as a macro manager was that: *"Credit cycling means in practice selling market leaders on a falling market and buying them on a rising one and, allowing for expenses and loss of interest, it needs*

phenomenal skill to make much out of it" (CWK XII: 100).

We undertake two simple tests of whether Keynes exhibited any ability to cycle between asset exposures or investment styles. First, we test for timing ability by regressing the realised equity risk premium (ERP_t) and Fama-French (1993) size (SMB_t) and value factor returns (HML_t) in year t on prior-year changes in the UK equity portfolio beta ($\Delta Beta_{t-1}$), median firm size ($\Delta Size_{t-1}$) and the median dividend yield (ΔDY_{t-1}) of Keynes' equity holdings. In the spirit of Cremers, Petajisto, and Zitzewitz (2012), the market return is the value-weighted UK equity index. SMB is defined as the geometric difference between the equally-weighted and value-weighted UK equity index, and HML the geometric difference between the returns on the top 50 and bottom 50 yielding constituents of the DMS 100 index. Dimson, Nagel and Quigley (2003) show that classifying UK equities by dividend yield produces very similar value and growth portfolios to those based on classifying stocks by their market-to-book ratio, which is not available pre-1946. These SMB and HML factors for the UK are estimated only at calendar year frequency.

In **Table 3**, Panel A, we report for the three periods 1922–45, 1922–32 and 1933–45 the equity beta, SMB and HML loadings of Keynes' equity holdings. In Panel B, we report the coefficients of realised risk premiums on Keynes' prior-year changes in UK equity risk exposures. The coefficients on $\Delta Beta_{t-1}$ and on ΔDY_{t-1} are the wrong sign to suggest market timing ability, and they are statistically insignificant. The coefficient on $\Delta Size_{t-1}$, although of the correct sign, is also statistically insignificant. There is no indication of market timing ability for the period up to 1932 or for the subsequent period.

In addition, we conduct a Henriksson-Merton (1981) parametric test by regressing

the quarterly excess returns on King's UK portfolio (measured relative to the risk-free rate) on the excess return on the UK equity market, and on the same excess market return interacted with a dummy variable taking the value one when this return is positive. This test also provides no hint of any market timing ability for the period up to 1932 or for the entire sample period (results not reported).

In August 1934, Keynes wrote to Francis Scott, the Provincial Insurance chairman, clearly stating his change of view: *"As time goes on, I get more and more convinced that the right method in investment is to put fairly large sums into enterprises which one thinks one knows something about and in the management of which one thoroughly believes"* (CWK XII: 57). He attributed his subsequent success managing the College investments to his decision to concentrate on a few core holdings, considered cheap relative to their intrinsic value and held for several years (CWK XII: 107). It would seem then that by August 1934 Keynes had fundamentally revised his investment approach. Substantiating this, our archival search reveals that Keynes corresponded with Scott on investment issues on only two occasions until late 1932 whereas, in the following two years, they corresponded on individual stock ideas on 74 occasions (King's Archives/PP/JMK/PC/1).

Consistent with the change in Keynes' investment approach there is a marked contrast in how he reacted to the major equity market falls in 1929–30 and in 1937–38. When the UK market began its fall in October 1929, he sold one-fifth by value of his UK equities over the following 12 months and switched into government bonds. In contrast, when the UK market began to decline sharply a second time in August 1937, he added modestly to his UK equity positions and maintained his equity allocation at over 90%.

It is unlikely that Keynes changed his investment philosophy in an instant. Bearing

this in mind, the archival evidence suggests that Keynes had substantially shifted his investment approach by late 1932, and in Section 5.2 we provide statistical evidence to support a structural break at around this time. Keynes' change of approach preceded publication of Graham and Dodd's (1934) influential first book. Graham had applied his value approach to managing his first fund from 1923–25 before establishing Graham-Newman in 1926 (Carlen, 2012: 142–3). Keynes' adoption of a value approach was certainly later than that of Graham but was developed independently: the King's College Archives do not indicate any contact between Keynes and Graham. We return to the important question of Keynes' strategic refocusing in Section 5.

4.3 Portfolio characteristics: sector, size, and yield

What did Keynes' equity portfolios look like? We consider the sector, firm size, and valuation characteristics of King's equity holdings. Note that in this section and unlike the rest of the paper, we refer to characteristics at calendar, rather than financial, year-end, in accordance with the DMS (2002) benchmark.

Figure 2 displays the rolling twelve-month sector weights of King's UK equities. Keynes concentrated the majority of his UK equity holdings in just two sectors, metal mining—tin mining stocks in the 1920s and gold mining stocks in the following decade—and commercial and industrial firms. His exposure to each of these sectors averaged one-third of his UK equity portfolio across the whole period.

His move into tin stocks in 1925 and 1926 was based on detailed statistical analysis by the *London and Cambridge Economic Service*, of which he was a director, that concluded a combination of price-inelastic supply and strong underlying demand would cause the tin price to appreciate sharply (CWK XII: 373-378, 416-421). Whilst he

speculated in tin futures on his own account at this time (Cavalli and Cristiano, 2012), he elected not do so for his college in favour of adopting a long position in low-cost Malayan tin miners. The accumulation of South African gold mining shares from early 1933 resulted from his early realisation that the devaluation of the South African currency would have a favourable impact on their earnings (CWK XXI: 225–29).

The four largest sectors of the London Stock Exchange comprised over three-quarters of the top 100 ordinary share capitalisation based on the DMS (2012) UK index constituents.[2] For comparison, we look at two representative year-ends, 1927 and 1936 when the largest sectors were commercial and industrial (40% and 44% respectively), banks (21% and 16%), oil (10% and 9%), and mines (6% and 10%). Keynes' active sector bets for these two years were –7% and –28% respectively in commercial and industrial stocks, and +36% and +56% in mining stocks respectively. He had no exposure in either year to banks or oil stocks, leaving him substantially underweight in both these sectors. The large exposure to commercial and industrial stocks in the early and mid-1920s comprised a selection of leading industrial names, though from the late 1920s he began to concentrate this exposure on the two leading British automobile stocks, Austin Motors and Leyland Motors.

Defining "technology" as comprising the automobile and aircraft manufacturing, electricity generation and electrical engineering, and chemicals and pharmaceuticals sectors, the index had a technology exposure of 9% in 1927 and 11% in 1936. Keynes overweighted technology relative to the index throughout the period with allocations averaging 13%, 27% and 17% of his UK equity portfolio in the 1920s, 1930s and 1940s

[2] We are grateful to Mike Staunton for making this data available.

respectively. Technology IPOs representing 16% of all IPOs in London between 1919 and 1938 were clustered in the hot markets of 1927–29 and 1935–38; see Chambers (2010: 60, Table 2). Keynes, with one exception, avoided technology IPOs. Furthermore, he timed investment in his two most important technology stocks, namely, Austin and Leyland, the automobile manufacturers when markets were more subdued. Together, they accounted for two-thirds of his technology exposure of between 40% and 50% from 1930 to 1934.

We also examine Keynes' portfolio exposure to companies doing business domestically or abroad. These stock weightings are highly correlated with the sectoral split between natural resource sectors (mining, oil and rubber) and the non-resource sectors. Hence, Keynes was heavily overweight in companies that were non-UK based, as compared to the market index. Such sector allocations, tech-stock exposure and non-UK focus, relative to the index, suggest a very active investment approach which went a long way to explaining his high tracking error of 13.9%. An additional source of this tracking error is likely to be attributable to the firm size and value tilt of his stock portfolio.

We define firm size in terms of ordinary share market capitalisation. **Figure 3** plots the inter-quartile size distribution of his UK shareholdings expressed as a percentage of the smallest constituent of the DMS 100 Share index**.** Other than during the period 1940–45, the majority of his portfolio holdings were firms with an ordinary market capitalisation placing them outside the top 100. He had a decided tilt towards mid-cap and small-cap stocks.

Similarly, the distribution of shareholdings by dividend yield diverged from that of the overall market. **Figure 4** shows that the median dividend yield of his dividend-paying

stocks remained above the dividend yield on the DMS 100 other than in 1922 and 1933. In the mid-1920s, the median dividend yield on his British holdings was between 6.6% and 8.6%, exceeding the market yield of 5.3%. From 1927 to 1936, he dramatically increased his holdings of mining stocks and recovery stocks which had passed their dividends such that his zero-dividend paying stocks accounted for one third of his equity holdings. Thereafter, the proportion of zero-dividend paying stocks fell back to less than one-fifth of his portfolio through both dividends being reinstated and disposals, and his portfolio readopted a high dividend yield tilt.

It is clear that Keynes took considerable risks in constructing his UK portfolio. He aggressively allocated to equities, adopted very active sector weightings, selected small-cap and mid-cap stocks, and rotated between high dividend yield and low dividend yield stocks relative to the market. Hence, we take into account this size tilt when comparing his performance to an equally-weighted UK equity index, which had generated an incremental 0.80% per annum over the value-weighted index from 1922 to 1946.

4.4 Keynes the active investor

Keynes leaves a few clues in his correspondence as to how he went about selecting his stocks. According to his credit-cycling approach, he restricted himself to “market leaders”. However, our analysis of his portfolio characteristics fails to confirm this claim, showing that he preferred stocks outside the top 100 firms both in terms of firm size and sector selection. In general, his stock-picking was the product of fundamental security analysis based on a judicious reading of the financial press and on sell-side research received mainly through two London stockbrokers, Buckmaster and Moore, and Laurence Keene and Gardner, and through provincial brokers such as Harold Brett. .

An example of his stock-picking is the South African mining company, Union Corporation, a DMS 100 share and one of his largest core holdings which accounted on average for 51% of his gold mine exposure over the period 1933-46. In another letter to Francis Scott dated June 21st, 1934, Keynes outlined the key reasons he still liked the stock, namely, the fact that it was a "value play" and that he evaluated and trusted the management very highly (CWK XII: 56). The shares traded at a 30% discount to his estimate of break-up value, a third of which was cash and government bonds. Keynes also thought in a novel way about equity valuation. For example, he estimated the value of Austin Motor shares in terms not only of earnings yield but also of market capitalisation per car produced and estimated that Austin traded at a 67% discount to General Motors in October 1933 (King's Archives JMK/PC/1/221-2).

To what extent was his performance driven by the active positions in his most favoured holdings? To answer this, we examine the performance of Keynes' best and worst five performing equities over the 100 quarters for which we have returns. We estimate performance over each quarter during which a stock is held, excluding any unlisted holdings and any holding less than 0.01% of the equity portfolio. In **Table 4**, Panel A, we present averages across each quarter, in the entire period 1921–46 and in three sub-periods, the raw returns of the top five performers, their market-adjusted returns, the sum of their portfolio weights of the top five stocks (VW), the sum of their portfolio weights if they had been equally-weighted with all other stocks (EW), and the sum of their market-adjusted return contribution when value- and equal-weighted respectively. Panel B repeats the analysis for the bottom five performers.

Whilst the results show that there was a substantial margin between his top and

bottom five performing holdings over all periods, Keynes added relatively little value in deciding how much to allocate to his best performers. On average in the 1920s and 1930s, he only overweighted his top five performers very modestly, compared to equally weighting them, and he underweighted them in the 1940s. He did a little better underweighting his bottom five performers, where he added value in all sub-periods.

By the time he became First Bursar, Keynes possessed a considerable network of City contacts. Cohen, Frazzini, and Malloy (2008) claim that networks between fund managers and senior corporate executives can partly explain investment outperformance. Keynes counted among his closest associates Samuel Courtauld, the Chairman of the multinational textile firm of the same name; Rupert Trouton, his former pupil, his broker and a director of the Norwegian whaling firm, Hector Whaling; and Henry Strakosch, chairman of Union Corporation. Keynes made use of Strakosch and his staff, particularly when selecting and undertaking due diligence on mining stocks (King's Archives KC/5/3). Yet, in the case of Austin Motors one of his largest holdings, there was no apparent connection.

Eldridge (2012) identifies 7632 personal contacts from Keynes' days at Eton, Cambridge, the Treasury during WW1, and from public life, and lists 1253 directors of enterprises in which Keynes invested. Eldridge concludes that Keynes was connected to directors at just 46 firms. Using Eldridge's dataset, we examine, first, whether Keynes' connections influenced his decision as to how much to put into a stock each quarter and, second, whether this was a benefit to stock performance.

Keynes put more money into his connected stocks. His average weighting in his connected stocks at 3.5% exceeded his weighting in non-connected stocks at 2.2%, a

difference significant at the 1% level. This provided a very modest uplift of 0.3% to the overall performance of his connected stocks over his non-connected stocks a difference which was not statistically significant (results not shown). However, when we partition his holdings into three large sectors (mining, commercial and industrial, and other), we find that it is only his connections in mining which lead him to take larger positions. Moreover, these larger positions in connected mining stocks did enhance performance. The average weighting in his connected mining stocks is 7.1% compared to only 1.8% in his non-connected mining stocks, a difference significant at the 1% level. The returns on his connected mining stocks are in turn on average 3.0% greater than on his non-connected stocks, a difference also significant at the 1% level (results not shown). His largest mining position is Union Corporation with an average weighting of 15.4% over the 59 quarters in which it is held and which delivers a return in line with the average return on his connected mining stocks.

Opportunistic trades by investors who are informed by insiders yield superior returns (Cohen, Malloy, and Pomorski, 2012). Keynes was obviously well connected but was he an insider? The investment community then did not have the same view of insider trading that we have today. Other than directors who owed fiduciary duties to their company not to trade on price-sensitive information, insider trading by investors in general was not subject to regulation until 1980 in the UK (Cheffins, 2008: 39–40). It is certain that Keynes was in receipt of what today would be deemed price-sensitive information – he was, for example, aware of a change in the UK bank rate before it occurred in 1925 (Mini, 1995). However, it is impossible to discover how frequently and the extent to which he exploited such information in his trading. What we can say is that

he would most certainly have regarded the exploitation of inside information as substantiating the view of stock trading as a “low pursuit” rather than a “game of skill” (CWK XII, 109).

Equally, Keynes did not make significant profits for King’s from flipping new issues. 31 of the 608 purchase transactions across the whole period were IPOs – seven between 1924 and 1929 and 24 between 1933 and 1938. He sold out of four of these issues in five days or less and another ten in less than three months. The value weighted return on these new issues was a modest 13.2%. Since the transaction size averaged GBP 900, less than half that of the average equity transaction in our sample, the return contribution to the Discretionary Portfolio from new issues was modest.

Keynes’ revised investment approach led to his systematically accumulating long-term positions in his favourite shares such as Union Corporation, Hector Whaling, and Austin Motors. The King’s endowment came to experience a downward trend in turnover and greater imbalances between large and small holdings. As we saw in Table 1, while Keynes had turned over his UK equities more frequently than once every two years in the 1920s, this had slowed to less than once every three years by the 1930s. Figure 1 highlights the growing gap between the actual number of equity holdings and the number that would, if held in equal weights, provide the same level of diversification, pointing towards increasingly uneven weights within portfolio holdings. In the next section, we dig more deeply into Keynes’ investment record and trading style.

5. Keynes’ trading behavior

In this section we study Keynes’ trading behavior through an evaluation of his equity transactions over his 25-year history as an institutional investor. First, we

investigate his investment record in event time, considering both pre- and post-transaction performance. We also infer from the performance record the interval during which his investment style changed, and we document the performance impact of his revised approach. We then examine the extent to which his profits were attributable to short- or long-term holdings. Following this, we explore whether Keynes displayed a disposition effect in his trading, being inclined to sell winners early and to hold on to losers in the hope of eventual success. Last, we evaluate whether Keynes tended to execute trades on a contrarian or momentum basis.

5.1 Abnormal returns

In the following analysis we examine the monthly performance of the 608 buy and 411 sell transactions in the UK equity portfolio over the financial years 1921–46. Of the buy and sell transactions, 81% were ordinary shares and the remainder were preference shares. Following standard event study methodology (Kothari and Warner, 2007), we calculate abnormal returns in a window centred on the month of the transaction. The return estimates cover the twelve months prior to the start of the month in which the transaction occurs, the partial-month return up to the transaction date, the partial-month return from the transaction date to the end of the month, and the twelve months from the end of the month in which the transaction occurs. Stock returns throughout are defined as capital appreciation plus dividend income. Since the London Stock Exchange *Supplementary List*, unlike the *Official List*, did not disclose *ex dividend* dates up to 1934, we apportion the annual dividend equally over the twelve months when estimating monthly total returns for these securities up to this point.

The buy-and-hold abnormal return (BHAR) for each security is defined as the

geometric difference between the security's observed cumulative return over a specified interval and the cumulative beta-adjusted return on the market over the same interval. We estimate BHARs over both pre-transaction intervals, ranging from twelve calendar months to one calendar month before the transaction date, and post-transaction intervals, ranging from one to twelve calendar months after the transaction date. Over the interval in common event time, we then estimate mean BHARs across all the securities bought (sold). The beta-adjusted return on the market makes use of the Vasicek (1973) method to estimate the beta for each security, and we employ Johnson (1978) skewness-adjusted t-tests to report statistical significance.

Unless otherwise stated, the abnormal returns reported below are equal-weighted. We also weight the BHARs by transaction size, adjusting for changes in the UK equity market index, with results that are broadly consistent with those reported below; and we also repeat the analysis replacing BHARs with cumulative abnormal returns (CARs), with similar results. The weighted BHARs and CAR based analysis is not reported.

The pre-transaction performance indicates the appreciation or depreciation that contributed to or anticipated a subsequent investment decision. The post-transaction performance reveals the economic consequences of the buys and sells of UK equities in the Discretionary Portfolio. The results for all Keynes' buy and sell transactions of UK equities for the Discretionary Portfolio over the whole period are summarised in **Table 5**. Pre-transaction returns are estimated to the day of the transaction from a number of months prior to the transaction month. Post-transaction returns are estimated from the day after the transaction to a number of months after the transaction month. Panels A and B show BHARs over 1921-46. Panels C and D, which we discuss in Section 5.2, show

BHARs over the financial years 1921–32 and 1933–46. The fact that there are fewer observations in Panel A than in Panel B, for both buys and sells, reflects trading in stocks that had recently received a listing and therefore did not possess a full price history across the 25-month window spanning the transaction date.

As can be seen in Panel A, both Keynes' buys and sells ran up strongly prior to his transacting. His buys returned +12.3%, +6.3%, and +2.5% respectively over 12, 6, and 3 months pre-transaction, all significant at the 1% level, while his sells also performed strongly, +18.3%, +12.1%, and +9.4% respectively, all significant at the 1% level, over the same periods. In Panel B, post-purchase share prices outperformed the market (+2.6%, +3.6%, and +1.8% over 3, 6, and 12 months, the 3 and 6 month returns significant at the 1% level) and also outperformed the market post-disposal (+1.7%, +2.2%, and +3.5% respectively, the 3 and 12 month returns significant at the 1% level and the 6 month return significant at the 5% level).

5.2 Change in Investment approach

In Section 4 we discussed the self-professed change in Keynes' investment approach. We now make use of the time series of post-transaction returns to estimate whether or not there was a structural break in Keynes' trading consistent with his assertions. His correspondence on investments with Scott indicated that this change was manifest by August 1934. Equally it is unlikely that he had discarded his earlier investment approach before the end of the bull market in October 1929.

We perform a Quandt-Andrews breakpoint test to explore the maximum likelihood of a structural break in any of the monthly abnormal returns series for each of months 0 through 12 post-transaction for buys and then sells. We calculate the LR-statistic

associated with each potential monthly breakpoint where the distribution of this follows Andrews (1993) with approximate asymptotic *p*-values provided by Hansen (1997). There are six potential structural breaks to be found in his sell transactions between September 1931 and July 1934, of which just one is statistically significant at the 5% level. In the case of his buy transactions, the analysis suggests a break in seven of the 13 post-transaction monthly time series between August 1929 and July 1932, one of which is statistically significant at the 5% level. The econometric evidence is mildly suggestive of a break in his trading behaviour in the early 1930s. Taken together with the archival evidence presented in Section 4, in the rest of this section we partition his trading before and after the financial year ended 1932. To check robustness, we also partition his trading at each of August 1929, 1930, 1931, 1933 and 1934, but since the main results are essentially unchanged we do not report the results.

Panel C of Table 5 therefore splits the pre-transaction BHARs for Keynes' buys and sells respectively into two periods: financial years 1921–32 and financial years 1933–46. Over the 12, 6, and 3 months pre-purchase, his stock picks in the earlier period had risen strongly, +19.2%, +11.6%, and +6.2%, all highly statistically significant, as compared to a more modest +8.8%, +3.6%, and +0.6% in the later period, the former two returns being significant at the 1% level. In contrast, the value of holdings that were sold in the later sub-period ran up more strongly over 12, 6, and 3 months pre-transaction, by an abnormal +21.3%, +12.7%, and +9.0%, all highly statistically significant, than those during the 1920s, +11.2%, +10.6%, and +10.4%, these returns being statistically significant at the 5% level. Hence, both purchases and disposals were usually made after favourable relative-to-market performance leading up to the trade. This general pattern is

consistent with that uncovered by more recent studies of US individual investor trading behavior (Odean, 1999, and Barber and Odean, 1999).

Panel D of Table 5 similarly splits the post-transaction BHARs for the buys and sells respectively into two periods: financial years 1921–32 and financial years 1933–46. In the bull market of the 1920s, Keynes tended to buy stocks that had outperformed though, in the post-purchase year they had an abnormal returns of –5.3%, which was marginally significant (10% level). For the stocks he bought, in the 1930s and 1940s, the story is different, and there is worthwhile post-transaction outperformance over 3 months (+4.0%), 6 months (+5.4%), and 12 months (+5.4%), all statistically significant at the 1% level. This improvement in the performance of his buys over 12 months of +10.7% is also significant at the 1% level. We obtain a similar result on a value-weighted basis (not reported).

In the sub-period up to 1932, the evidence based on post-transaction performance is that Keynes managed to time his sell decisions well. On average, his 1920s sales were followed by abnormal returns close to zero (+0.2%, –1.5%, and +1.3% over 3, 6, and 12 months). Over 12 months, his buys did worse than the stocks he sold in this earlier period to the detriment of performance. In the later sub-period, prices continued to rise, albeit modestly, after he sold (+2.3%, +3.7%, and +4.4% over 3, 6, and 12 months post-transaction). Value-weighting returns again gives similar results (not reported). Our event study reveals no indication of skill in timing disposals during the 1930s and 1940s. Rather, it seems that his sell ideas came from among the stocks he previously bought which had performed well.

5.3 Investment horizon

Our event study follows performance through to a year after the transaction, even if the position was closed out before a year had passed. To investigate performance over different investment horizons, we therefore partition the post-transaction BHARs by the length of holding period of each stock. We consider holding periods of 0–2 months, 2–12 months, and over 12 months. **Table 6**, Panel A, displays results across the whole period. In the first row, his trading of securities held only for the very short-term (0–2 months) was highly profitable over the period to the end of the first post-transaction month (+19.1%) or to the end of the second month (+17.3%), although, had he waited 6 months until selling, these purchases would have risen by as much as +29.3%. Those stocks held for 2–12 months were still profitable, although less so (second row), but they did not appreciate very much after disposal (fifth row). The long-term holdings (over 12 months) had only returned +1.9% after 4 months, significant at the 1% level, but achieved zero abnormal performance by the end of 12 months (third row). Post-disposal performance of his long-term holdings continued to be strong up to 12 months later, +3.3% significant at the 1% level (sixth row).

In Panel B of Table 6, we partition the holding period analysis of his buys and of his sells into the two periods 1921–32 and 1933–46. Again it is apparent that he was a good short-term trader generating strong double-digit returns over both one and two months post-transaction (Panel B, first and second rows). In contrast, he traded his longer-period holdings much better in the later period than in the earlier period. In the period 1933–46, his stocks held for 2–12 months returned +4.7% after 2 months and up to +14.1% after 12 months (fourth row), versus a non-significant –2.3% and –8.7% after 2

and 12 months respectively in the period 1921–32 (third row). Similarly, in the later period, his long-term holdings held over 12 months had outperformed by 3.4%, significant at the 1% level, at the end of 12 months (sixth row), versus a statistically insignificant –6.8% in the earlier period (fifth row). The difference in equally-weighted mean BHARs of the stocks held over 12 months is +10.2%, significant at the 1% level, whilst that in the transaction value-weighted mean BHARs is +7.7%, also significant at the 1% level (not reported).

An examination of his sells in Panel B suggests that over time, whilst the disposal of his short-term holdings in the later period was similar to the earlier period, the timing of sales of his long-term holdings was poor in the later period. During 1933–46, his long-term holdings continued to rise relative to the market by up to 4.5% over 12 months after disposal (final number in the entire table). The main results reported in Table 6 remain unchanged when value-weighting BHARs. We conclude that post-transaction performance reinforces the view that Keynes exhibited more skill in buying individual stocks after the financial year 1932. **Figure 5** illustrates this improvement across the two periods. The upper chart presents the post-purchase performance of his 2–12 month holdings, while the lower chart presents the post-purchase performance of his over 12 month holdings.

5.4 Disposition effect

Odean (1998, 1999) and Odean, Barber, and Strahilevitz (2011), observe that different psychological mechanisms affect the buying and selling decisions of investors. As Odean explains, "*Buying is forward-looking and selling is backward-looking. We tend to consider what a new stock will do for the portfolio and what a current holding has done*"

(Ervolini, 2009). Odean contends that, when buying, investors consider the past only inasmuch as they believe it is informative about the future, but when it comes to selling their focus is heavily on the past and many investors, seeking to minimize regret, sell winners too early and hold on to their losers. The latter is the disposition effect first postulated by Shefrin and Statman (1985). In this section, we consider whether Keynes was susceptible to this well-known behavioral bias – the desire to avoid regret.

Some investors, of course, sell losers rather than winners for such reasons as window dressing or managing capital gains tax liabilities. However, as discussed in Section 3.1, there was no indication of window-dressing, and capital gains tax had not yet been introduced. We therefore consider whether Keynes exhibited the disposition effect by utilising the same transactions data set as above. Following Odean (1998), if Keynes exhibited regret in his stock trading then his proportion of gains realized (PGR) should exceed his proportion of losses realized (PLR) where:

PGR = Number of Realized Gains / (Number of Realized and Unrealized Gains) (1)

and

PLR = Number of Realized Losses / (Number of Realized and Unrealized Losses) (2)

Unrealized (paper) gains and losses of all the holdings in the portfolio that are not traded are determined by reference to the average purchase price.

Accordingly, each month we count the number of realized gains (losses) whenever Keynes traded a stock along with the unrealized gains (losses). We then estimate the mean PGR and PLR for the entire dataset covering 1921–1946 and for two sub-periods prior and subsequent to a potential break in his trading behavior. As before we take

August 1932 as our breakpoint, but since there were only two realizations that financial year (see Table 1) we deem the potential breakpoint (Break) in trading behavior to be August 1932 or a year before/after then. We present average results for 1924–Break and for Break–1946. Given that Keynes did not trade equities every month and only realised either a gain or a loss 58% of the time, the PGR and PLR statistics are low in absolute terms. However, we are interested in the difference between the two proportions.

In **Table 7**, we report the mean PGR, PLR and the difference between the two for the entire dataset covering 1921–1946, and for sub-periods up to and after the potential break in his trading behaviour. PGR always exceeds PLR and the difference in the two ratios for the whole period, the earlier period and the later period is 0.013, 0.016, and 0.010, statistically significant at the 1%, 5% and 5% levels respectively. Thus Keynes displayed a disposition effect across all periods: he was inclined to sell winners too early and to hold on to losers in the hope of eventual success.

5.5 Contrarian or momentum trader?

In 1939, Keynes identified aircraft manufacturing and armaments stocks as undervalued following heavy share price falls (CWKXII: 72) and proceeded to buy shares in these sectors in the early years of WW2. This is an anecdotal illustration of his contrarian trading. We use the King's transactions data to determine whether Keynes exhibited a general tendency towards contrarian or momentum investing. We classify an investor as a *contrarian buyer* if he buys conditional on an abnormal security-price fall with greater frequency than that expected assuming a random distribution of trades within the sample period. Alternatively, he would be a *momentum buyer* if his frequency of purchases after an abnormal security-price rise exceeds that expected assuming a

random distribution of trades.

Following Goetzmann, and Massa (2002) and Blackburn, Goetzmann, and Ukhov (2011) we use a binomial distribution to determine whether the number of contrarian (or momentum) trades exceeds that expected had the investor traded randomly. The probability of being a contrarian (or momentum) trader is determined as follows:

$$P(X > x) = 1 - \sum_{y=0}^{x-1} \binom{n}{y} p^n (1-p)^{n-y} \tag{3}$$

where n is the total number of buys, x is the number of buys consistent with a particular strategy, and p is the probability of observing a positive return. A contrarian strategy is denoted as significant (p < 0.10) by ** or as non-significant (0.10 < p < 0.50) by *.

Our results for Keynes' purchase activity are displayed in **Table 8** for short-term (one-month and three-month), medium-term (six-month), and long-term (12-month) horizons. Keynes displayed contrarian behavior over all intervals and all investment horizons.

6. Discussion

Keynes did not chart an unhindered course of investment success from beginning to end, as has been previously assumed. His initial setbacks buttressed his influential metaphor of financial markets resembling a beauty contest, and led him to bemoan the seeming inability of the "serious-minded" investor "to purchase investments on the best genuine long-term expectations he can frame" (Keynes, 1936: 156). In such a market, smart investing is not necessarily rewarded. Our event study shows that the pattern of Keynes' negative post-transaction returns in the 1921–32 period is similar to that of

individual investors (Odean, 1998 and 1999, and Barber and Odean, 1999). A behavioral interpretation of this result is that Keynes placed too much value in his top-down investment prowess to the detriment of performance.

Our study suggests that, after the 1920s, Keynes revised his investment philosophy and modified his approach to equity investment. This finding is consistent with our archival research of his correspondence, and the results from our analysis of his event time performance. From the early 1930s he was no longer having to make top-down asset allocation decisions which compromised his stock-picking instincts, and he could now take greater care in timing the purchases of those stocks he liked. As Keynes is purported to have said "*When the facts change, I change my mind. What do you do sir?"* (Malabre, 1994, p.220). Well, he changed his mind about the best way to manage portfolios.

Our evaluation of Keynes the investor lends color to several strands of the finance literature. Chevalier and Ellison (1999a) report that older managers, being less concerned about termination, take on more unsystematic risk and construct less conventional portfolios. Chevalier and Ellison (1999b) conclude that the educational background of fund managers explains good investment performance. In a retail context, Grinblatt, Keloharju, and Linnainmaa (2012) show that ability as proxied by IQ contributes to better investment results. Keynes had been investing personally for 14 years prior to becoming a college bursar at the age of 36, having graduated with a first class degree in mathematics, and having been placed second out of 104 candidates in the Civil Service entrance examinations. Cohen, Malloy, and Pomorski (2012) emphasize the benefits of informed trading in the investment world, and Keynes' deep personal contacts in the

mining sector provided him with valuable insights that were associated with superior returns.

An investment approach inspired by Markowitz (1952) is to take a large number of active positions, each of a limited scale, and to diversify sufficiently to achieve modest but relatively consistent performance. An early illustration would be the Foreign & Colonial Investment Trust, which was structured to give broad exposure to an asset class (Chambers and Esteves, 2012). A modern example would be the Norwegian Government Pension Fund (Chambers, Dimson, and Ilmanen, 2012). However, as Boyle Garlappi, Uppal, and Wang (2012) draw to our attention, Keynes eschewed extreme diversification in favour of large exposures to securities that reflected his preferences and skills as an asset manager. Keynes' investment style is supported by modern evidence from Brown, Garlappi, and Tiu (2010) who find that more actively managed endowments perform some 3%–6% above their more passive counterparts

Crucially, the right organizational set-up is necessary to allow investment talent to flourish. It helps to work in an environment that does not suffer from non-endowment cash flows that are volatile (Dimmock, 2012). According to Chen, Hong, Huang, and Kubik (2004), solo fund managers perform better than a team of fund managers because they process soft information more easily and hold a less conventional portfolio. Outperforming managers take on more idiosyncratic risk, being able to hold a relatively high proportion of local stocks in their portfolios (Coval and Moskowitz, 2001). Being free to pursue one's best investment ideas enhances performance (Ivković, Sialm, and Weisbenner, 2008; Cohen, Polk, and Silli, 2010). Keynes was able to construct idiosyncratic portfolios, concentrating on relatively few sectors and adopting a small cap bias, precisely because

investing for his college, where he enjoyed the full confidence of his Fellows, was the most rewarding of his many investment responsibilities.

Unsurprisingly, Keynes withdrew from his two most public investment roles where he felt constrained by the organization. He resigned the chairmanship of the National Mutual, where he tired of the cross-examination of his investment decisions. His co-management of the Independent Investment Trust, a listed closed-end fund, with a former Treasury colleague suffered from a failure to agree on investment policy and proved spectacularly unsuccessful (CWK XII, p.32–36). In contrast, his college had allowed him the freedom to develop his investment ideas, to apply them to the management of endowments and, when necessary, to adapt his investment approach.

7. Conclusion

This study of Keynes' stock market investing offers both a reappraisal of his investment performance and an assessment of his contribution to professional asset management. The King's College endowment permitted Keynes to give full expression to his investment abilities. We provide the first detailed analysis of his investment ability in terms of his management of the King's portfolios. Previous studies had claimed that Keynes' performance for his college was stellar. Our results, however, qualify this view. According to our event time analysis, the changing pattern of cumulative returns around his buy and sell decisions before and after the difficult early 1930s, provides evidence to substantiate Keynes' own claims that he fundamentally overhauled his investment approach. Essentially, he switched from a macro market-timing approach to bottom-up stock-picking.

Furthermore, this study offers more than just a reappraisal of his investment

performance. Keynes' experience at King's foreshadowed important developments in modern investment practice on several dimensions. First, his strategic allocation to equities was path-breaking. Not until the second half of the twentieth century did institutional fund managers follow his lead. His aggressive purchase of equities pushed the common stock weighting of the whole endowment's security portfolio over 50% by the 1940s. This was as dramatic and far-sighted a change in the investment landscape as the shift to alternative assets in more recent times. At the same time, his approach to equity investment also anticipated the development of small stock and value investment strategies which have been defined retrospectively by modern research. Second, his willingness to take a variety of risks in the King's portfolio and to depart dramatically both from the market and institutional consensus exemplifies the opportunity available to long-term investors such as endowments to be unconventional in their portfolio choices. Third, the contrast between the receptive environment at King's and the conditions he faced at other institutions reminds us of how critical, conditional on possessing investment talent, is the right organisational set-up. Talent alone is not enough. Equally, his achievements underscore the main finding of Lerner, Schoar, and Wang (2008) in their analysis, two generations later, of the leading Ivy League endowments that such idiosyncratic investment approaches are very difficult for the vast majority of managers to replicate.

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Table 1. Summary of UK stock transactions for King's Discretionary Portfolio

Buy and Sell equity transactions are summarised by financial year, ended August. Mean value is the total cost and proceeds of the transactions in each financial year, divided by the total number of Buys and Sells (N) respectively. Equity turnover is the average of equity purchases and sales in a financial year divided by the average of start- and end-year equity portfolio values. Keynes began trading in July 1921 so there is no turnover figure for 1920–21.

Financial year	Buys (in GBP)			Sells (in GBP)			Equity turnover
	N	Total costs	Mean value	N	Total proceeds	Mean value	
1920-21	20	9,764	488	0	0	—	—
1921-22	19	9,367	437	1	487	487	33%
1922-23	3	5,819	955	13	15,281	1,175	63%
1923-24	20	38,111	1,906	6	15,058	2,510	89%
1924-25	29	43,961	1,418	24	32,002	1,231	66%
1925-26	17	36,806	1,937	8	31,461	3,933	48%
1926-27	16	45,823	2,695	9	19,523	1,952	43%
1927-28	25	54,637	1,707	18	38,788	2,155	63%
1928-29	11	19,178	1,598	14	33,368	2,225	36%
1929-30	14	16,259	1,084	19	28,048	1,122	35%
1930-31	14	10,291	735	7	6,021	753	18%
1931-32	15	11,472	717	2	1,118	559	15%
1932-33	25	40,336	1,345	23	33,197	1,186	43%
1933-34	24	46,600	1,726	35	67,333	1,603	43%
1934-35	52	79,507	1,395	36	78,538	1,916	52%
1935-36	25	55,173	2,043	28	60,609	1,638	33%
1936-37	48	81,839	1,364	28	39,500	1,162	28%
1937-38	41	46,682	881	39	64,155	1,365	26%
1938-39	13	11,938	746	16	17,103	900	9%
1939-40	33	41,030	954	11	20,058	1,337	20%
1940-41	38	70,941	1,391	3	4,560	912	18%
1941-42	11	23,125	1,360	9	24,558	2,233	9%
1942-43	25	85,054	2,577	16	33,287	1,664	17%
1943-44	22	99,302	3,103	16	45,033	2,144	15%
1944-45	31	115,036	2,876	21	49,829	1,718	15%
1945-46	17	72,103	3,795	9	36,975	3,361	8%
Total	608	1,165,190	1,614	411	795,889	1,618	33%
1921-29	160	263,465	1,700	93	185,967	2,018	55%
1930-39	271	400,098	1,371	233	395,622	1,473	30%
1940-46	177	506,591	3,012	85	214,301	2,493	14%

Table 2. King's College performance 1921–46

The total returns of the Discretionary Portfolio, Restricted Portfolio, and the Total Fund ex real estate of King's College are estimated from the annual *Reports to Inspectors of Accounts*, King's College Archives for financial years ended August. The UK Equity Index is based on the equally-weighted DMS total return index. The UK Government Bond Index is the total return on UK Consols, the benchmark UK government security. The risk-free rate is the Treasury Bill rate. Returns are expressed as percentages. Maximum and minimum are shown in bold typeface. AM = arithmetic mean; SD = standard deviation; Sharpe = Sharpe ratio. Financial year-end is August.

Financial year	Discretionary Portfolio (1)	Restricted Portfolio (2)	Total Fund ex real estate (3)	UK Equity Index (4)	UK Govt Bond Index (5)	Relative performance (1) - (4)
1921-22	35.33	16.80	18.17	31.40	26.40	3.94
1922-23	9.55	9.41	9.43	30.66	4.59	–21.11
1923-24	15.68	5.59	6.47	0.69	2.26	14.99
1924-25	41.32	4.70	9.62	11.46	3.10	**29.87**
1925-26	6.29	5.42	5.61	10.81	2.65	–4.53
1926-27	1.42	2.70	2.48	26.30	3.08	**–24.88**
1927-28	2.96	7.95	6.99	18.78	8.12	–15.82
1928-29	6.36	3.64	4.14	5.99	–0.31	0.37
1929-30	–14.21	0.36	–2.19	–18.74	9.13	4.53
1930-31	–11.53	–6.34	–7.16	**–30.89**	8.03	19.37
1931-32	32.65	5.82	9.40	26.15	**29.40**	6.50
1932-33	**51.43**	**30.93**	**34.40**	**32.13**	5.87	19.30
1933-34	26.60	13.39	17.50	11.38	12.92	15.21
1934-35	34.02	7.77	17.27	7.21	6.71	26.81
1935-36	39.57	11.77	23.40	22.83	4.39	16.74
1936-37	11.30	–1.00	4.26	1.67	**–10.15**	9.63
1937-38	**–22.58**	**–8.55**	**–15.01**	–8.71	4.93	–13.87
1938-39	8.92	–3.93	1.36	–5.57	–10.01	14.50
1939-40	–5.85	5.83	0.41	–18.84	16.61	13.00
1940-41	30.45	23.74	26.60	28.52	15.01	1.93
1941-42	8.39	9.04	8.77	10.85	4.43	–2.46
1942-43	39.74	7.82	22.04	27.86	–0.49	11.88
1943-44	15.60	5.24	10.70	12.06	2.87	3.54
1944-45	13.29	4.42	9.67	5.59	12.33	7.70
1945-46	22.48	7.84	17.36	19.66	14.58	2.83
AM	15.97	6.81	9.67	10.37	7.06	5.60
SD	19.08	8.48	10.85	17.11	9.06	13.87
Sharpe	0.73	0.57	0.71	0.49	0.56	n/a

Table 3. UK Discretionary Portfolio: market-timing tests

In Panel A we report the UK equity portfolio's market beta and its loadings on the SMB and HML factors. In Panel B we regress the equity risk premium (ERP_t) and the size (SMB_t) and value factor returns (HML_t) in year t on Keynes' prior-year changes in the UK equity portfolio beta ($\Delta Beta_{t-1}$), in median firm size ($\Delta Size_{t-1}$) and in the median dividend yield (ΔDY_{t-1}). The market return is the value-weighted DMS 100 index. SMB is defined as the geometric difference between the equally-weighted and value-weighted UK equity index, and HML is the geometric difference between the returns on the top 50 and bottom 50 yielding constituents of the DMS 100. These SMB and HML factors for the UK are only available at calendar year frequency. Significance levels are reported in italic beneath each coefficient.

A: Loadings on contemporaneous factors

Period	Intercept	R_m-R_f	SMB	HML
1922–45	0.064	1.167	–0.378	–1.216
	0.08	*0.00*	*0.71*	*0.05*
1922–32	–0.026	0.910	–1.411	–0.351
	0.48	*0.01*	*0.17*	*0.61*
1933–45	0.073	1.601	0.894	–0.245
	0.29	*0.00*	*0.64*	*0.84*

B: Regression of premia on prior changes in exposure

		Dependent variable		
		ERP_t	SMB_t	HML_t
		Explanatory variable		
Period	Number of observations	$\Delta Beta_{t-1}$	$\Delta Size_{t-1}$	ΔDY_{t-1}
1922–45	24	–0.008	–0.025	–0.031
		0.90	*0.65*	*0.42*
1922–32	11	–0.043	–0.014	–0.006
		0.84	*0.88*	*0.94*
1933–45	13	–0.002	–0.080	–0.052
		0.96	*0.34*	*0.20*

Table 4. UK Discretionary Portfolio: top and bottom five performing stocks

All stocks held at the beginning of each quarter, other than any holding less than 0.01% of the equity portfolio, are ranked by their total return over the quarter. Panel A averages across each quarter in the entire period 1921–46 and three sub-periods the raw returns of the top five performers, their market-adjusted returns, the sum of the portfolio weights of the top five performers (VW), the sum of their portfolio weights if equally-weighted with all other stocks (EW), and the sum of their market-adjusted return contributions when value- and equal-weighted respectively. Panel B repeats the analysis for the bottom five performers.

%	Raw return	Market-adjusted returns	Weight		Market-adjusted return contribution	
			VW	EW	VW	EW
A: Top five performers						
1921–46	29.2	26.2	16.5	15.6	3.1	3.4
1921–29	16.3	12.9	27.6	25.1	3.0	2.7
1930–39	38.8	36.9	13.7	12.4	4.2	4.7
1940–46	30.9	26.6	7.0	8.9	1.7	2.4
B: Bottom five performers						
1921–46	-19.3	-21.4	11.8	15.6	-2.1	-3.1
1921–29	-14.8	-17.6	20.4	25.1	-3.0	-4.1
1930–39	-25.3	-26.2	6.1	12.4	-2.1	-3.3
1940–46	-16.0	-18.9	6.1	8.9	-1.1	-1.7

Table 5. UK Discretionary Portfolio: event time performance 1921–46

Equally-weighted mean BHARs are estimated for all public equity transactions in financial years, ending in August, over 1921–46. All returns are expressed in %. Pre-transaction returns are estimated to the day of the transaction from a number of months prior to the transaction month. Post-transaction returns are estimated from the day after the transaction to a number of months after the transaction month. Panels A and B show BHARs over 1921–46. Panels C and D show BHARs over 1921–32 and 1933–46. Based on the Johnson (1978) skewness-adjusted t-test we report statistical significance at the 1%, 5%, and 10% level denoted by [a], [b], and [c] respectively. The number of observations in Panels A and C is lower than in Panels B and D because transactions in recent IPOs did not have a complete set of pre-transaction prices.

A: Full-period pre-transaction BHARs starting 12–1 months before the transaction month

	12	11	10	9	8	7	6	5	4	3	2	1
Buys 1921-46	12.3[a]	11.4[a]	10.5[a]	9.0[a]	7.8[a]	6.7[a]	6.3[a]	4.7[a]	4.6[a]	2.5[a]	1.5[b]	0.7
No of obs	541	544	548	553	556	559	563	563	563	565	569	571
Sells 1921-46	18.3[a]	17.2[a]	16.4[a]	16.9[a]	15.3[a]	14.1[a]	12.1[a]	10.9[a]	10.2[a]	9.4[a]	7.4[a]	6.0[a]
No of obs	375	376	378	379	381	382	385	389	390	394	396	400

B: Full-period post-transaction BHARs ending 1–12 months after the transaction month

	1	2	3	4	5	6	7	8	9	10	11	12
Buys 1921-46	2.6[a]	2.6[a]	2.6[a]	2.8[a]	3.3[a]	3.6[a]	2.6[a]	2.8[a]	2.7[a]	2.6[b]	2.1[c]	1.8
No of obs	608	608	608	608	608	608	608	608	608	608	608	608
Sells 1921-46	1.2[a]	1.3[b]	1.7[a]	1.7[b]	2.1[b]	2.2[b]	2.5[b]	2.7[b]	3.1[a]	3.3[a]	3.6[a]	3.5[a]
No of obs	411	411	411	411	411	411	411	411	411	411	411	411

C: Subperiod pre-transaction BHARs starting 12–1 months before the transaction month

	12	11	10	9	8	7	6	5	4	3	2	1
Buys 1921-32	19.2[a]	18.0[a]	17.5[a]	15.4[a]	13.3[a]	11.1[a]	11.6[a]	9.0[a]	9.2[a]	6.2[a]	5.2[a]	3.2[b]
No of obs	185	185	186	187	188	189	191	191	191	192	194	195
Buys 1933-46	8.8[a]	8.0[a]	6.9[a]	5.7[a]	5.0[a]	4.5[a]	3.6[a]	2.5[b]	2.2[b]	0.6	-0.4	-0.6
No of obs	356	359	362	366	368	370	372	372	372	373	375	376
Sells 1921-32	11.2[b]	11.3[c]	10.7[b]	13.5[b]	13.4[c]	11.5[c]	10.6[b]	10.9[b]	9.3[b]	10.4[b]	7.6[b]	4.9[a]
No of obs	112	113	114	114	115	115	117	119	119	120	120	120
Sells 1933-46	21.3[a]	19.7[a]	18.9[a]	18.3[a]	16.0[a]	15.3[a]	12.7[a]	11.0[a]	10.6[a]	9.0[a]	7.3[a]	6.4[a]
No of obs	263	263	264	265	266	267	268	270	271	274	276	280

D: Subperiod post-transaction BHARs ending 1–12 months after the transaction month

	1	2	3	4	5	6	7	8	9	10	11	12
Buys 1921-32	0.0	0.4	0.2	-0.1	0.4	0.0	-2.3	-2.9	-3.1	-2.8	-3.8	-5.3[c]
No of obs	204	204	204	204	204	204	204	204	204	204	204	204
Buys 1933-46	3.9[a]	3.9[a]	4.0[a]	4.4[a]	4.8[a]	5.4[a]	5.1[a]	5.8[a]	5.7[a]	5.3[a]	5.2[a]	5.4[a]
No of obs	404	404	404	404	404	404	404	404	404	404	404	404
Sells 1921-32	-0.8	-0.2	0.2	0.1	0.7	-1.5	-2.5	-1.3	-1.1	-0.5	0.5	1.3
No of obs	121	121	121	121	121	121	121	121	121	121	121	121
Sells 1933-46	2.1[a]	1.9[a]	2.3[a]	2.3[a]	2.7[a]	3.7[a]	4.5[a]	4.4[a]	4.8[a]	5.0[a]	5.0[a]	4.4[a]
No of obs	290	290	290	290	290	290	290	290	290	290	290	290

Table 6. UK Discretionary Portfolio: event time post-transaction performance 1921–46

Equally-weighted mean BHARs are estimated for all public equity transactions in financial years, ending in August, from 1921 to 1946. All returns are expressed in %. Post-transaction returns are estimated from the day after the transaction to a number of months after the transaction month. Panel A shows BHARs for Buy and Sell transactions averaged across all financial years 1921–46. Panel B shows BHARs averaged over the financial years 1921–32 and 1933–46. Both panels also partition returns into three holding periods: under 2 months, 2–12 months, and over 12 months. N denotes the number of observations for each holding period. Based on the Johnson (1978) skewness-adjusted t-test we report statistical significance at the 1%, 5% and 10% level denoted by [a], [b], and [c] respectively.

A: Full-period post-transaction BHARs ending 1–12 months after the transaction month

	Years	N	1	2	3	4	5	6	7	8	9	10	11	12
Buys over various holding periods														
< 2 months	21-46	28	19.1[a]	17.3[a]	19.2[a]	21.6[a]	26.7[a]	29.3[a]	22.8[a]	18.8[a]	24.2[a]	25.8[a]	22.8[a]	21.1[a]
2–12 months	21-46	82	3.0[b]	2.1[c]	1.7	2.5	3.3	4.8[b]	5.1[b]	4.7	4.7	4.5	5.4	5.8
> 12 months	21-46	498	1.6[a]	1.9[a]	1.9[a]	1.9[a]	2.0[b]	1.9[b]	1.1	1.6	1.1	0.9	0.4	0.0
Sells over various holding periods														
< 2 months	21-46	27	4.3[a]	6.3[a]	4.6[c]	6.7[b]	9.0[b]	5.0	2.5	6.3[c]	7.7[c]	6.3[c]	6.2	4.7
2–12 months	21-46	81	0.2	-0.2	-0.2	0.1	-0.6	0.1	1.9	2.2	2.8	3.2	3.2	3.6
> 12 months	21-46	303	1.2[a]	1.2[c]	1.9[a]	1.6[b]	2.2[b]	2.5[b]	2.6[b]	2.6[b]	2.8[b]	3.1[b]	3.5[b]	3.3[b]

B: Subperiod post-transaction BHARs ending 1–12 months after the transaction month

	Years	N	1	2	3	4	5	6	7	8	9	10	11	12
Buys over various holding periods														
< 2 months	21-32	8	18.6[a]	20.2[a]	30.7[a]	34.7[a]	49.7[a]	57.9[a]	39.5[a]	25.6[a]	39.0[a]	37.8[a]	34.2[a]	38.9[a]
	33-46	20	19.3[a]	16.1[a]	14.6[a]	16.3[a]	17.5[a]	17.9[a]	16.1[a]	16.1[a]	18.3[a]	20.9[a]	18.3[a]	14.3[b]
2–12 months	21-32	30	-1.5	-2.3	-2.6	-3.8	-5.3	-4.9	-4.5	-6.2	-6.8	-5.7	-7.0	-8.7
	33-46	52	5.6[a]	4.7[a]	4.2[a]	6.1[a]	8.2[a]	10.3[a]	10.7[a]	11.1[a]	11.4	10.4[a]	12.5[a]	14.1[a]
> 12 months	21-32	166	-0.6	0.1	-0.8	-1.1	-1.0	-1.9	-3.9	-4.0	-4.0	-4.4	-5.0	-6.8[b]
	33-46	332	2.7[a]	2.9[a]	3.2[a]	3.3[a]	3.4[a]	3.7[a]	3.4[a]	4.2[a]	4.2[a]	3.5[a]	3.1[a]	3.4[a]
Sells over various holding periods														
< 2 months	21-32	8	-0.5	6.4[b]	6.8	19.2[a]	24.3[b]	11.4[c]	3.9	11.1	11.1[b]	8.3	8.7	10.1
	33-46	19	6.4[a]	6.2[a]	3.6	1.4	2.5	2.2	3.6	4.3	6.2	5.4	4.4	2.5
2–12 months	21-32	23	-0.7	0.3	-2.4	-1.0	-3.3	-4.8	-3.8	-3.4	-3.8	-3.2	-1.9	1.1
	33-46	58	0.5	-0.3	0.7	0.6	0.5	2.0	4.1	4.4	5.5	5.7	5.3	4.7
> 12 months	21-32	90	-0.9	-0.9	0.3	-1.3	-0.3	-1.8	-2.3	-1.8	-1.5	-0.6	0.1	0.6
	33-46	213	2.1[a]	2.1[a]	2.6[a]	2.8[a]	3.3[a]	4.3[a]	4.7[a]	4.4[a]	4.5[a]	4.7[a]	4.9[a]	4.5[a]

Table 7. PGR and PLR for UK Discretionary Portfolio 1921–46

For the stocks held in the UK Discretionary Portfolio, this table compares at the end of each month the Proportion of Gains Realized (PGR) to the Proportion of Losses Realized (PLR), where PGR is the number of realized gains divided by the number of realized and unrealized gains and PLR is the number of realized losses divided by the number of realized and unrealized losses. We estimate the mean PGR and PLR for the entire dataset covering 1921 to 1946 (column (1)), and for sub-periods up to and after a potential break in his trading behaviour. We deem the potential break in trading behavior to be in August 1932 or a year before/after then. We average results across all three periods from 1921 to the breakpoint (column (2)) and across all three periods from the breakpoint to 1946 (column (3)). The financial year ends in August. We test the statistical significance of the difference in the mean PGR and PLR and report the associated *p-values*.

Proportion of gains/losses realized	(1) 1921–46	(2) 1921–Break	(3) Break–1946
Mean PGR	0.033	0.033	0.033
Mean PLR	0.020	0.017	0.023
Difference in mean PGR and PLR	0.013	0.016	0.010
(p-value)	*(0.002)*	*(0.043)*	*(0.012)*

Table 8. UK Discretionary Portfolio: Keynes' equity trading behavior 1921–46

Keynes' equity trading behavior is classified using a binomial distribution to determine whether the number of his purchases following a contrarian or momentum strategy is greater than expected had he traded randomly. We consider the timing of his purchase transactions in relation to the prior abnormal performance of each individual share over one-month, three-month, six-month, and 12-month periods prior to his trading. His trading is classified as contrarian, namely, purchasing conditional on a prior negative return; or momentum. We classify each strategy's significance by its p-value. A contrarian strategy is denoted as significant ($p<0.10$) by ** or as non-significant ($0.10<p<0.50$) by *. The financial year ends in August.

Time horizon	1921–32	1932–46
1-month	0.013**	0.000**
3-months	0.016**	0.000**
6-months	0.056**	0.000**
12-months	0.033**	0.000**

Fig. 1. UK Discretionary Portfolio concentration

The measures of portfolio concentration are monthly averages. In the area charts, C1 is the percentage of the market value of the Discretionary Portfolio' UK equity portfolio allocated to the largest equity holding, C5 is the percentage allocated to the largest five equity holdings, and C20 is the percentage allocated to the largest twenty equity holdings. The unshaded bars report the number of companies held and Sharpe's D is the reciprocal of the Herfindahl index of the individual equity weights. Under the assumption of the single-index market model, a portfolio with a diversification of D has the same residual risk as a portfolio comprising D equal-sized holdings of average-risk stocks.

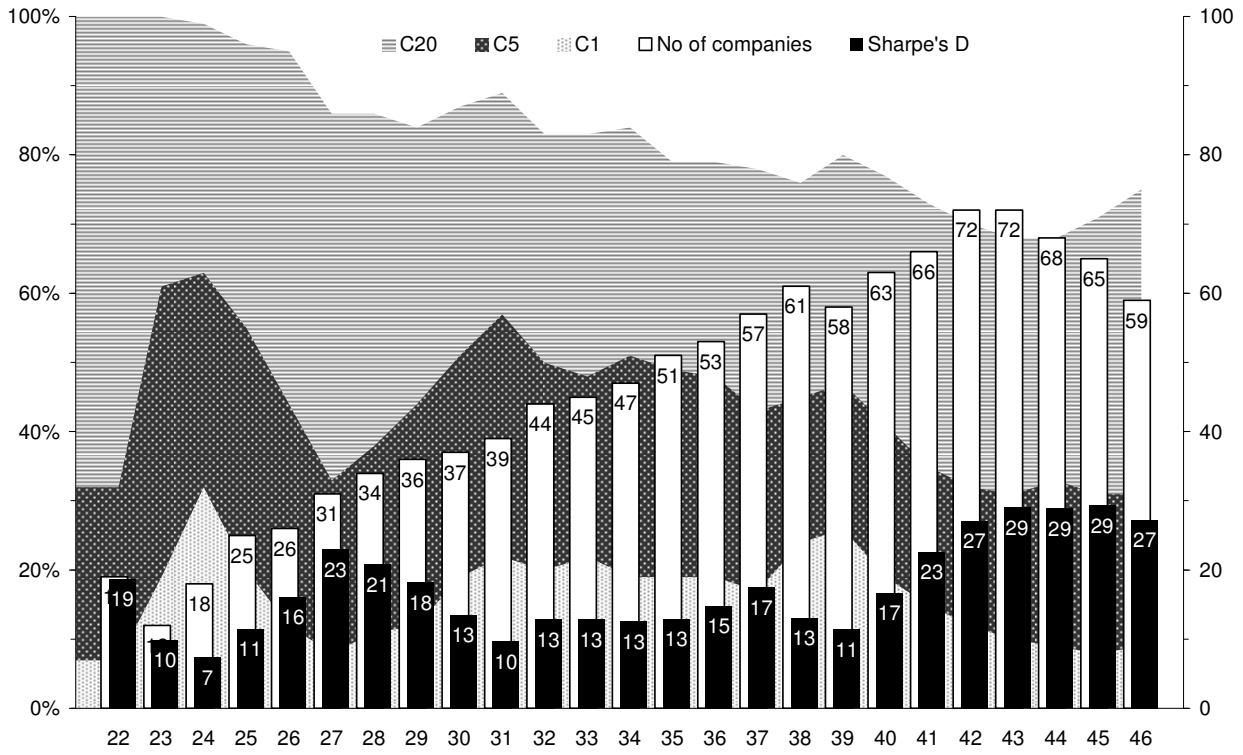


Fig. 2. UK Discretionary Portfolio sector weights 1922–46

Weights within the UK equity portfolio are estimated over rolling twelve-month periods from August 1922 to August 1946. Sector definitions follow the LSE classification. Others include Breweries, Electric, Lighting & Power; Financial, Trusts, Land, etc.; Insurance; Investment Trusts; Rubber; Telegraphs & Telephones.

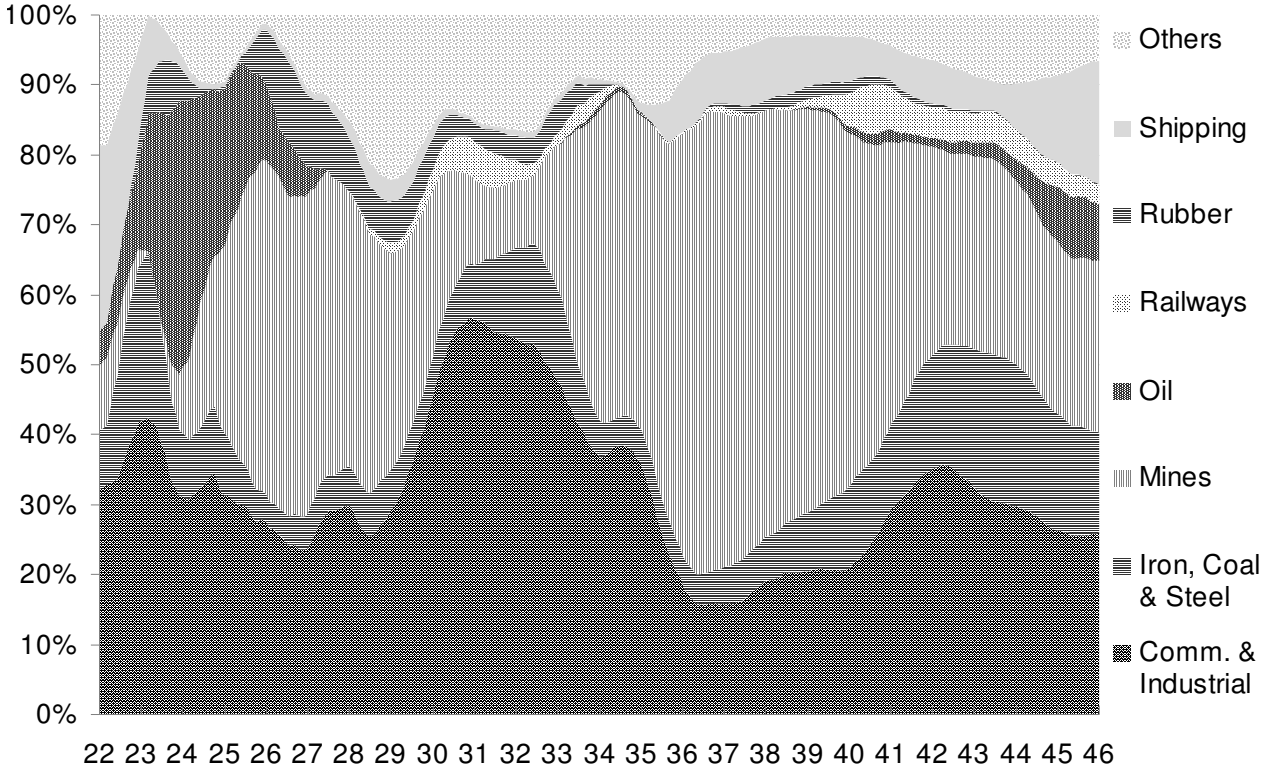


Fig. 3. Size distribution of UK Discretionary Portfolio holdings 1921–45

Size is defined as ordinary share market capitalisation. At each calendar year-end, the 25th percentile, median, and 75th percentile are expressed relative to the size in that year of the smallest firm in the DMS 100 on a logarithmic scale.

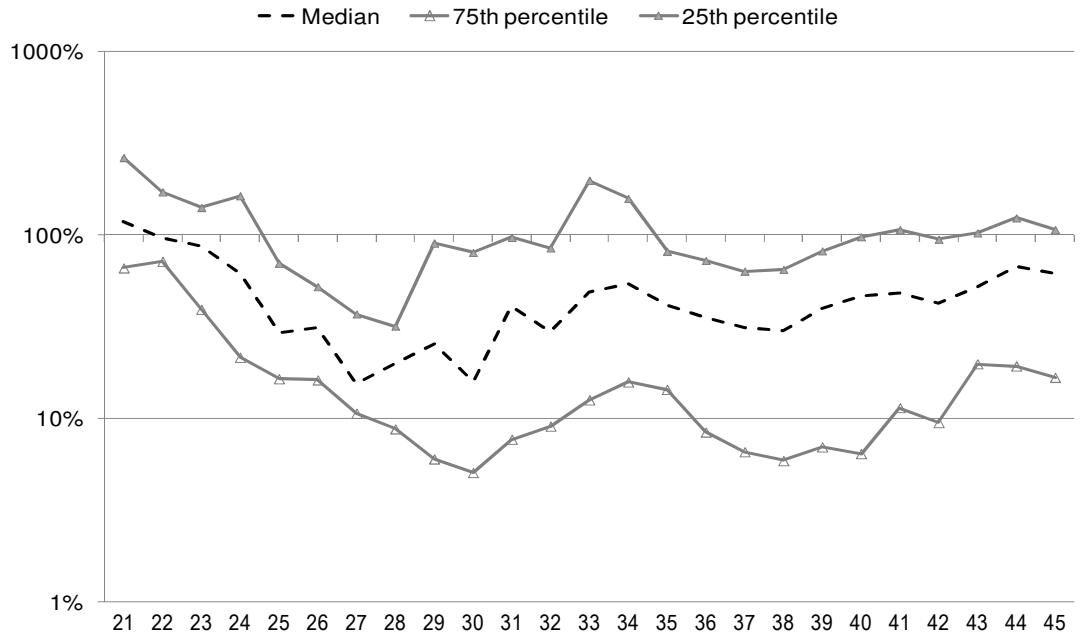


Fig. 4. Yield distribution of UK Discretionary Portfolio holdings 1921–45

At each calendar year-end, the 25th percentile, median, and 75th percentile dividend yields are expressed relative to the UK equity market dividend yield on a logarithmic scale (line plot). The bar chart shows the number of zero-yield equities.

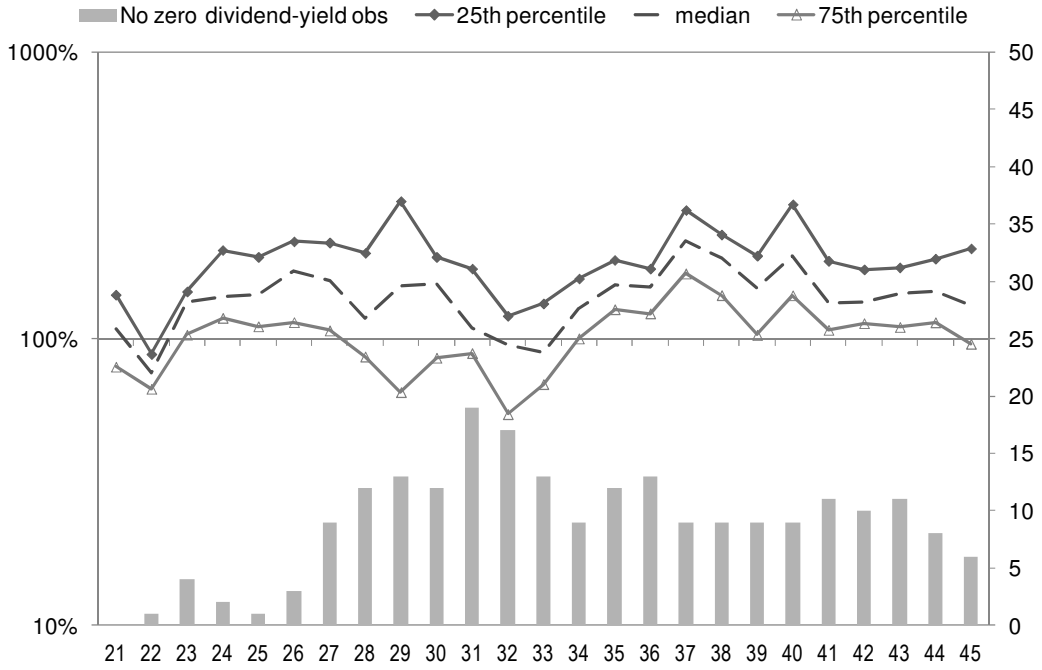
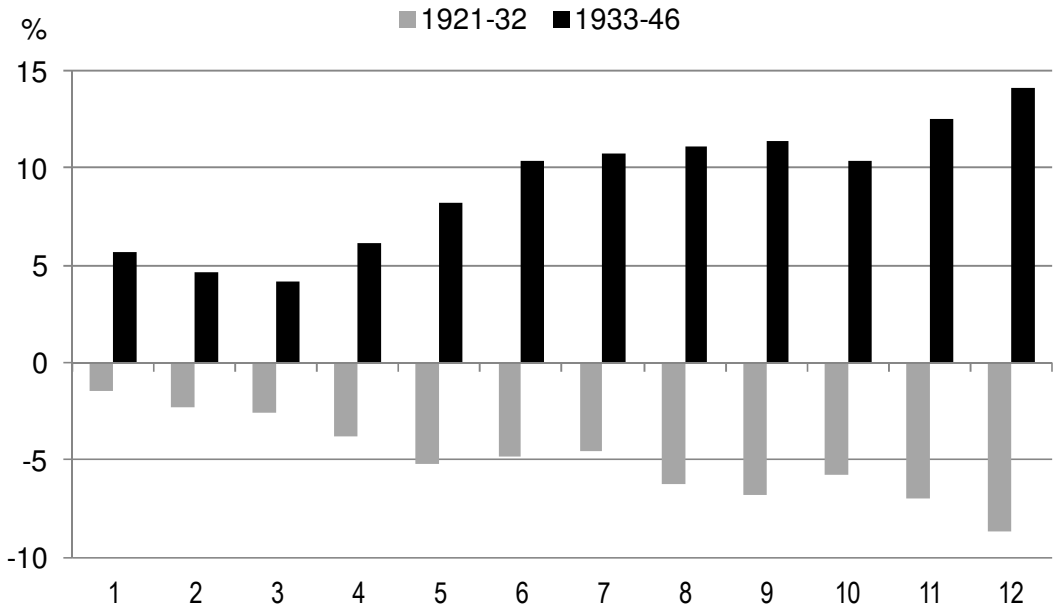
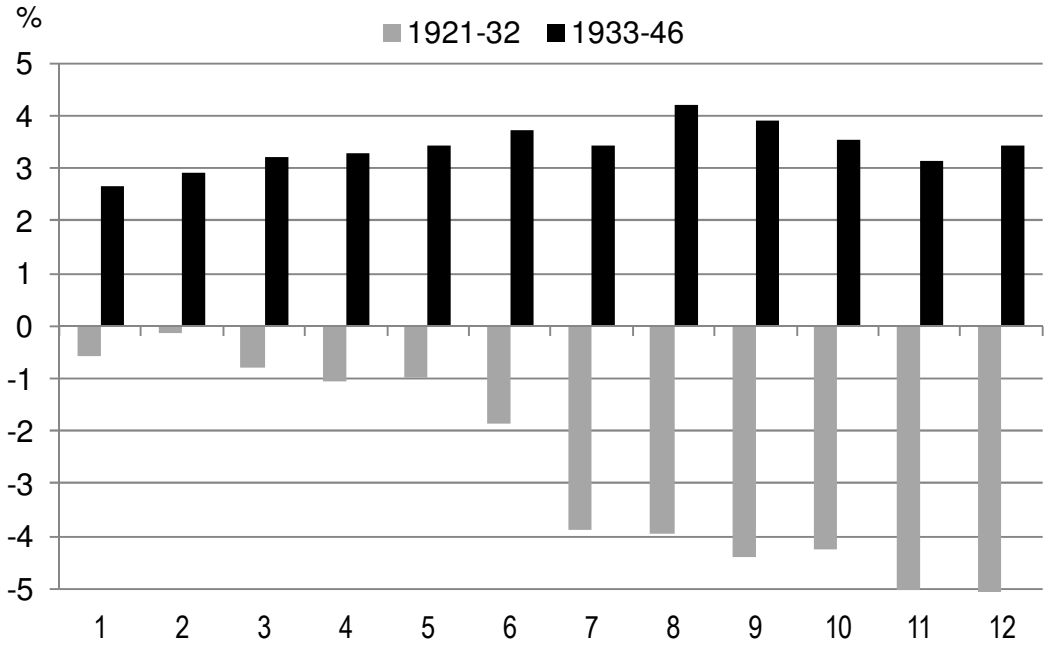


Fig. 5 UK Discretionary Portfolio: event time performance 1921–46

(i) Post-transaction BHARs of stocks held between 2 and 12 months



(ii) Post-transaction BHARs of stocks held over 12 months