Rule Britannia!: British Stock Market Returns, 1825-1870

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Abstract

This article presents a new series of monthly equity returns for the British stock market for the period 1825-70. As well as calculating capital appreciation and dividend yields, the article also attempts to take account of the effect of survivorship bias on returns. Three notable findings emerge from this study. Firstly, stock-market returns in the 1825-70 period are higher in Britain than in the United States. Secondly, real returns in the 1825-70 period are higher than in subsequent epochs of British history. Thirdly, unlike the modern era, the vast majority of returns in our sample period come from dividends rather than capital appreciation.

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INTRODUCTION

In this paper, we present newly-developed monthly indices of returns for the British stock-market for the period 1825 to 1870. Such historical series of returns are of interest to economic historians for at least two reasons. Firstly, indices of returns can frequently serve as a measure of the levels and fluctuations of real economic activity, which may be particularly important in historical periods where there is a shortage of real economic data. Secondly, series of returns can be used to assess the impacts on an economy of major political, legal or technological changes. Financial economists are also becoming increasingly interested in the historical returns of financial assets.[1] This interest partially stems from a desire to calculate the expected equity risk premium, which requires long time series of historical returns to reduce the estimation error.[2] In particular, academics and practitioners are interested in discovering whether or not the high returns on stock-markets over the past half-century are an aberration or are somehow intrinsic to equity as an asset. An interest in long-term returns also stems from a desire to test asset pricing theories, test for market efficiency, and examine relationships between stock returns and real activity.[3]

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[1] Ibbotson and Sinquefield, "Stocks"; Goetzmann, "Patterns"; Jorion and Goetzmann, "Global"; Goetzmann *et al*, "New Historical Database"; Dimson and Marsh, "U.K. Financial Market Returns"; Goetzmann and Ibbotson, *Equity Risk Premium*.

[2] Goetzmann and Ibbotson, *Equity Risk Premium*.

[3] Barro, "The Stock Market"; Fama, "Stock Returns"; Schwert, "Stock Returns"; Dimson and Marsh, "U.K. Financial Market Returns."

Long-run series of stock-market returns are available for the majority of industrialized nations, but mainly focus on the second half of the twentieth century.[4] However, to date, monthly returns data stretching back into the nineteenth-century has only been developed for the United States.[5] This article contributes to the development of monthly returns series by constructing monthly returns for stocks traded on the London market for the period 1825 to 1870.

During the period of our study, Britain underwent major social, legal and technological changes, which affected the demand for and supply of equity capital contracts. This makes the development of our series of returns all the more pertinent and interesting. On the demand-side, the increasingly-prosperous middle classes were seeking an alternative to consols for their savings.[6] On the supply-side, Parliament increasingly bypassed the conservative common law by repealing the Bubble Act in 1825, by permitting banks (in 1826) followed by other businesses (in 1844) to form freely as corporations, by allowing companies to adopt limited liability from 1855 onwards, and by being liberal in granting corporate status and limited liability, particularly to railways. Furthermore, the development of the steam locomotive resulted in a capital-intensive industry requiring large amounts of equity investment.

The only stock market indices for pre-1870 Britain are the Gayer *et al* monthly index which covers the period 1811 to 1850; F. A. Hayek's unpublished monthly index which covers 1820-68; and Rousseaux's annual index for 1825-67, which, following the

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[4] Dimson *et al*, *Triumph of the Optimists*.
[5] Goetzmann *et al*, "New Historical Database." Grossman, "New Indices" has constructed annual indices of total returns for the British stock market for the period 1870 to 1914.

[6] Gayer *et al*, *Growth and Fluctuation*, vol. I, pp.377, 380, 410.

criticism of Gayer *et al*, is infrequently used.[7] From the perspective of the financial economist, these series are defective because they are indices of price appreciation only. Consequently, in this paper, we develop a series of monthly returns, comprising both capital appreciation and dividends for Britain for the period 1825 to 1870.

Gayer *et al*'s and Hayek's indices can also be criticized because they are small samples rather than including all available stock price data. The Gayer *et al* index only looks at the shares of 63 companies, whereas in 1850, for example, there are over 300 common equity securities listed in the *Course of the Exchange*. Hayek's index only contains a sample of industrial shares, and therefore excludes banks and insurance companies. In contrast, our indices cover the vast majority of stocks traded on the London market. In addition, the previously-constructed indices could be criticized as they mainly include stocks which survived and were frequently quoted for the entire period, thus causing a sample selection bias. We avoid such a bias by collecting all available stock-price data reported in this period. Furthermore, our estimates are adjusted for survivorship bias.

A further defect of existing indices is that they are either unweighted in the case of Hayek's or weighted by the number of shares outstanding in the case of the Gayer *et al* index. This latter index also assigned weights to each industry sub-category based on paid-up capital, but these weights only change five times throughout their sample period. In contrast, we produce unweighted indices as well as indices weighted by paid-up capital

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[7] Gayer *et al*, "British Share Prices"; *Growth and Fluctuation.* Hayek's and Rousseaux's indices are reproduced in Gayer *et al*, *Growth and Fluctuation*.

and market capitalization, with weights changing on a monthly basis. Such indices will permit us to ascertain the relative performance of small and large firms.

When we compare the returns generated in the 1825-70 British equity market with those produced in the United States and with later periods in Britain, we find that our sample period was an apparent golden era for investors as they received higher returns yet faced lower risk. We suggest that this finding may be due to Britain enjoying a comparative advantage in this period arising from its position as the first industrial nation and the existence of capital-market imperfections. We also find that in the second half of the twentieth century, dividends constitute a substantially smaller proportion of total returns than they did in the nineteenth century.

This paper proceeds as follows. The second section outlines the data sources used and our sampling methodology. The third section describes how our portfolios and indices are constructed. The fourth section analyses the size of our sample and its main constituents; it also presents estimates of total market capitalization. The fifth section examines our monthly indices of market capitalization. The sixth section analyses dividend yields and total returns in our sample period. In the seventh section we adjust our series of returns for survivorship bias. The penultimate section compares the returns on the British market for our sample period with later periods in the history of Britain's stock market and with returns on the US capital market in the period 1825-70. The final section concludes.

DATA AND METHODOLOGY

The main source of data for this project is the *Course of the Exchange*, which from the beginning of the nineteenth century had been regarded as the official price list for the London Stock Exchange.[8] Up until 1843, it was published in London twice weekly (Tuesdays and Fridays), and from then on it was published daily by James Wetenhall, a London stockbroker. We obtained a duplicate of the British Library's microfilm copy of this publication, which covers the period from March 1825 onwards. The *Course of the Exchange* reports for each stock, the number of issued shares, the nominal and paid-up (or par) value of shares, the dividend paid by the stock, and a share price if trade had taken place in the company's stock.

Our sample period begins in 1825 because this marks the beginning of the liberalization of incorporation law in Britain. Furthermore, prior to this period the performance of joint-stock companies was closely tied to that of the government, possibly because such companies were a part of the government's politico-economic apparatus.[9] The main two examples of this are Bank of England and East India Company. For this reason, these two companies are excluded from our sample. Notably, the *Course of the Exchange* viewed these securities in this way as it reported the stock prices of these companies in a separate section along with the price of government debt instruments.

We manually collected the last share price of the month for all common equity stocks reported in the *Course of the Exchange*, working our way methodically through each monthly issue. The small number of colonial and foreign railways listed in the

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[8] Harris, *Industrializing English Law*, p.120.
[9] Gayer *et al*, *Growth and Fluctuation*, vol. I, p.410.

Course of the Exchange is excluded because it is difficult to tell whether securities are debt, common equity or preference shares. Thankfully, *The Railway Times* enabled us to verify the nature of British railway securities. In our sample period, there were 1,119 different companies and 1,657 different common equity securities listed in the *Course of the Exchange*. Unlike previous indices, we attempt to include all stocks reported in the *Course of the Exchange* with several exceptions. Firstly, all stocks which were listed for less than 12 months are excluded as it is doubtful as to whether these companies really got off the ground. Indeed, even though many of these companies were listed, in many cases very few stock prices were actually reported. As can be observed from Table 1, nearly half of those companies excluded on this criterion were railways. Secondly, 100 companies were excluded because no capitalization data (i.e. number of issued shares, nominal or paid-up value) was reported for the stock in the *Course of the Exchange*.[10] Such data is necessary to estimate market capitalization as well as construct value-weighted indices. Thirdly, stocks were excluded if prices were reported for less than 10 per cent of their listing duration. This excludes infrequently traded stocks, which were typically issued by very small companies. Using this criterion, we excluded 175 stocks. Notably, using an even less stringent criterion (i.e. 5 per cent), would still result in the vast majority of these firms being excluded from our indices. As can be seen from Table 1, after applying the above criteria, we had data on 1,015 securities for 681 companies.

INSERT TABLE 1

The relative illiquidity of the nineteenth-century stock market meant that in some months no trades took place, and hence no stock prices were reported in the *Course of the*

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[10] *The Railway Times* was used to help fill in missing capitalization data for British railways.

Exchange. As can be seen from Table 1, on average, stock prices were reported for 67.6 per cent of the months for which a stock was listed. If there was no stock price reported in a particular month or for several months and the stock was still listed, we assumed that the last reported price was the current stock price for the month, and if no stock price was reported for 48 consecutive months or more, we assumed that the company didn't exist for this period. In order to check for the robustness of this methodology, we also calculated returns whenever having no share price reported meant that that particular stock was omitted from our calculations. This approach has virtually no effect on our average return estimates, although, unsurprisingly, the standard deviation is slightly higher.

Each stock price series was analysed individually so as to pick up data-inputting errors or printing mistakes in the *Course of the Exchange*. If a share price was substantially out of line with prices either side of it, the *Course of the Exchange* was double-checked, and in the event that it wasn't a data-inputting error, it was deleted and the previous reported price was used as the current month's price. This, however, was extremely uncommon.

The *Course of the Exchange* reported annual or semi-annual dividends in each issue usually as a percentage of nominal capital, except for several companies where dividends were reported as dividend per share. Dividends were assumed to be zero when no dividend was reported. For each stock, we calculated the annual dividend per share, which was then spread out evenly over the 12 months. The monthly dividend yield for each stock was obtained by dividing this figure by the previous month's share price.

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INDEX CONSTRUCTION

Our indices are calculated using returns data, which is how other historical stock market indices have been created.[11] As is well known, the total return of a stock consists of capital appreciation and dividend yield. The capital appreciation for stock i at month t is calculated as:

$$A_{i,t} = \frac{p_{i,t} - p_{i,t-1}}{p_{i,t-1}}$$

where $p_{i,t}$ is the stock price of security i in month t. The dividend yield for stock i at month t is calculated as:

$$DY_{i,t} = \frac{d_{i,t}}{p_{i,t-1}}$$

where $d_{i,t}$ is the dividend per share paid on security i in month t. Consequently, the total return on security i in month t is:

$$R_{i,t} = A_{i,t} + DY_{i,t}$$

The capital appreciation of the overall market in month t is a weighted average of each stock's capital appreciation:

$$MA_t = \sum_{i=1}^{N} w_{i,t} A_{i,t}$$

where $w_{i,t}$ is a weighting factor. Similarly, the dividend yield of the overall market in month t is a weighted average of each stock's dividend yield:

$$MDY_t = \sum_{i=1}^{N} w_{i,t} DY_{i,t}$$

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[11] Schwert, "Indexes of U.S. Stock Prices"; Goetzmann *et al*, "New Historical Database"; Grossman, "New Indices."

Consequently, the total return of the overall market in month t is:

$$MR_t = \sum_{i=1}^{N} w_{i,t}(A_{i,t} + DY_{i,t})$$

We use three different weighting factors when constructing our indices. Firstly, we use market capitalization as a weighting factor, where

$$w_{i,t} = \frac{p_{i,t} q_{i,t}}{\sum_{i=1}^{N} p_{i,t} q_{i,t}}$$

Secondly, we use a paid-up capital as a weighting factor, where

$$w_{i,t} = \frac{v_{i,t} q_{i,t}}{\sum_{i=1}^{N} v_{i,t} q_{i,t}}$$

Thirdly, we use an equally weighted (or unweighted) method:

$$w_{i,t} = \frac{1}{N_t}$$

where N_t is the number of securities existing on the market at time t; $q_{i,t}$ is the number of issued shares for stock i; $v_{i,t}$ is the paid-up capital for stock i at time t.

The advantage of the unweighted returns is they won't be overly affected by large price movements, particularly of large firms. On the other hand, the unweighted returns give equal weight to large economically-important stocks and relatively small unimportant stocks. A more fundamental problem is that when stocks are illiquid and trade infrequently, this can introduce a significant bias into equally-weighted long-term returns. As some stocks in our sample were traded infrequently, we also weight our returns using paid-up capital and market capitalization in order to overcome this potential upward bias. The weights on the paid-up capital returns will possibly be quite dated as

paid-up capital doesn't change often. However, weighting returns by market capitalization overcomes this deficiency.

In our sample period, the establishment of new companies and the growth of industry meant that companies, in order to finance their investment needs, were either increasing their share issues or, as was more often the case, calling in uncalled capital in order to augment paid-up capital. Occasionally, companies engaged in stock splits, possibly to increase the marketability of their stock. In order to take account of the effect of changes in paid-up capital, nominal value or number of issued shares on stock returns, we eliminate stocks which have such changes from our capital appreciation calculations for the month in which the capitalization change occurs as it is difficult to determine the actual capital appreciation in such circumstances.[12]

Annual calendar total returns for the overall market are calculated by compounding monthly returns. Annual calendar capital appreciation is also calculated by compounding monthly returns. Annual dividend yield for the overall market is then calculated by subtracting the annual capital appreciation from annual total return.

Our capital appreciation and total return data are converted into indices, with March 1825 being the base month, at which date the indices (I_t) are set to 100. At month t, the index number for each of the returns series (MA_i, MR_i) equals:

$$I_t^{MA} = \prod_{i=1}^{T} (1 + MA_i) \times 100$$

$$I_t^{MR} = \prod_{i=1}^{T} (1 + MR_i) \times 100$$

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[12] Grossman, "New Indices," p.125.

SAMPLE CHARACTERISTICS

In the years 1824-25, 127 companies were formed and in still business at the end of 1825, a further 118 were established and subsequently abandoned during the period, and a further 143 companies were projected.[13] According to Hunt, the "years 1824 and 1825 witnessed a veritable avalanche of extravagant promotions and general speculation" in the stock market.[14] Although this growth in joint-stock companies may be partially due to the repeal of the Bubble Act and the eradication of corporate monopolies in banking and marine insurance,[15] it may also reflect the *Pax Britannica* which had emerged following the nation's victory in the Napoleonic Wars.

From Figure 1, we can see that the number of companies listed on the *Course of the Exchange* at the end of 1825 was 236. However, the financial crisis which began at the end of 1825 resulted in the disappearance of many companies - there were only 192 companies listed in 1828. As can be seen from Figure 1, our sample excludes many of the short-lived 'bubble' companies in existence in this period.

INSERT FIGURE 1

The number of securities exceeds the number of companies in Figure 1 because firms sometimes had "old" and "new" stock trading simultaneously or firms issued several types of common equity, usually having different paid-up values. For example, from 1837, the National Provincial Bank had two types of common stock: one type had a £100 paid-up value, while the second type had a £20 paid-up value. As we can see from

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[13] English, *Complete View*.

[14] Hunt, *Development of the Business Corporation*, p.30.

[15] Harris, *Industrializing English Law*, p.218.

Figure 1, multiple issues of common equity became more common with the rapid expansion of the railway sector in the mid-1840s.

The sharp increase in the number of companies in our sample between 1834 and 1836 is predominantly due to the establishment of banks and railways. The increase in the number of railway companies was a result of a boom in railway promotion, whereas the growth in number of joint-stock banks can be largely attributed to the passage of legislation in 1833 (3 & 4 Will. IV, c.98), which permitted non-issuing joint-stock banks to establish in London. The subsequent fall in the number of companies listed and in our index can mainly be explained by the disappearance of companies which had established in the mania of 1836 as well as the demise of ten canal companies.

The famous railway mania of 1844-45 is almost solely responsible for the increase and subsequent fall in the number of securities and companies included in our indices in the mid-1840s. Notably, as can be seen from Figure 1, there were many 'bubble' railway companies and securities listed in the *Course of the Exchange*.

Notably, the freedom to incorporate, which was granted in 1844, and the freedom to incorporate with limited liability, which was granted in 1855, does not appear to have affected the number of companies issuing publicly-quoted equity.[16] It is only after the passage of the 1862 Companies Act[17] that there is a steep increase in the number of companies listed in the *Course of the Exchange* and in our sample. The financial crisis triggered by the Overend Gurney collapse in May 1866 resulted in the failure of many of

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[16] The Acts referred to are: Joint Stock Companies Registration and Regulation Act (1844), 7 & 8 Vict., c.110, and An Act for Limiting the Liability of Members of Certain Joint Stock Companies (1855), 18/19 Vict., c.113.

[17] 25 & 26 Vict. c.89.

these newly-established companies, which explains the post-1865 fall in the number of companies listed and in our sample.

From Figure 2, which contains the paid-up capital and market capitalization of our sample of stocks, we can see that for the decade up until 1834, the value of stocks changed little, which is unsurprising given that the number of companies in our sample doesn't change much in this period. From c.1834 until 1845, nominal total market capitalization and market capitalization as a proportion of GDP increases substantially. As can be seen from Figure 2, this is mostly attributable to the advent of the railways. Notably, it is during the railway mania of the mid-1840s that total paid-up capital and total market capitalization deviate substantially for the first time. The collapse of the railway mania in late 1845 is particularly apparent in the fall in market capitalization as a proportion of GDP. The subsequent calls on railway shareholders to pay up uncalled capital results in an increase in paid-up capital, accompanied by a few years of volatility in the total value of the market.

INSERT FIGURE 2

As can be seen from Figure 2, market capitalization rises quickly from the end of 1851 until July 1853, thereafter it falls markedly over the next ten months. This is more than likely due to the monetary shock arising from the increase in Bank Rate from 3 to 5.5 per cent over this time period, which was a reaction to harvest failures and the growing threat of war in the Near East.[18] Indeed, it was only towards the end of the Crimean War that total market capitalization begins to rise, and it follows an upwards trend (nominally and relative to GDP) until the Overend Gurney collapse in May 1866.

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[18] Clapham, *Bank of England*, vol. II, p.218.

A large proportion of the increase in market value, particularly from 1862 onwards, was due to new non-railway companies coming to the market.

As can be clearly seen from Table 2, which presents data on the annual breakdown of our sample by industrial sector, great changes occurred in the make-up of the equity market in our sample period. For example, the canal sector dominates our sample in terms of market capitalization and number of issues at the beginning of our sample period, but by the end it has effectively disappeared. On the other hand, from the mid-1830s onwards, railways increasingly dominate our sample in terms of market capitalization and even issues for a time. By the time our sample reaches the 1860s, railways and banks are by far the two largest sectors in terms of market capitalization. In terms of percentage of issues, banks have close to one-fifth of the market in the 1860s, closely followed by the railways. Insurance is always a major component of total issues throughout the sample period, but the coming of the railways into the market results in the insurance sector's share of market capitalization eventually falling below 10 per cent.

INSERT TABLE 2

The 'other' category includes companies from the following sectors: water utilities; roads; bridges; docks; telegraph companies; gas, light and coke companies; shipping; food production; industrial; brewing; manufacturing; investment, financial and mortgage; and land. During our sample period, close to 30 per cent of issues and 20 per cent of market capitalization (on average) are in this category.

As the *Course of the Exchange* only covers companies traded on the London market, a question arises as to how representative our sample is of the overall British equity market. Grossman's indices for the British equity market begin in 1870, and his

sample covers the majority of equities issued in Britain's various stock exchanges.[19] His

sample includes 520 equities, with an approximate market capitalization of £750m. In

contrast, our sample, which is based on those firms listed in the London stock exchange,

has 240 securities in 1870 with an approximate market capitalization of £285m. The

difference in market capitalization is largely explained by the absence of foreign railways

from our sample. Whereas the difference in issues can be largely attributed to foreign

railway stock and joint-stock banks which were traded in the regional stock exchanges

that had been established from the mid-1830s onwards.[20] In summary, apart from some

Irish, Scottish, and English provincial banks, our sample provides a reasonably good

coverage of equity issued by British companies.

INDICES OF CAPITAL APPRECIATION

Figure 3 and Appendix Table 1 contain our monthly capital appreciation indices. The

index weighted by market capitalization outperforms our other indices until early 1867,

when the unweighted index surpasses it. This suggests that large companies performed

better in terms of capital appreciation than small companies for most of the sample

period. However, after early 1867, small firms appear to perform relatively better than

large firms, possibly because the risk premia for small firms had increased after the

financial crisis stemming from the Overend Gurney crash demonstrated the fragility of

small newly-formed companies.

INSERT FIGURE 3

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[19] Grossman, "New Indices."

[20] See Killick and Thomas, "Provincial Stock Exchanges."

The index weighted by paid-up capital performs least well of the three indices, particularly after the late 1840s. This suggests that companies with larger paid-up capital performed less well than their peers. This is not surprising given that, as can be seen in Figure 2, the paid-up capital of the market exceeded total market capitalization from early 1848 until 1862. A fraction of railway companies which established during the mania had high paid-up capital, but in the crash their share prices fell below their par value and remained there for a long period of time.

As can be seen from Figure 3, given the small samples used, the method of constructing the indices, and the absence of value weighting, the Gayer *et al* and Hayek indices differ from our new indices. The large fall in the two existing indices at the beginning of the sample period is mainly due to the collapse in mining shares. Our indices also fall at this time, but because of our larger sample, the fall in mining shares has less of an impact on our unweighted index. As can be seen from Table 3, our new indices are negatively correlated with that of Gayer *et al*, and positively correlated with Hayek's.

INSERT TABLE 3

DIVIDEND YIELDS AND TOTAL RETURNS

Figure 4, which contains monthly dividend yields for the entire sample, reveals that the dividend yield is consistently higher in the unweighted series. This suggests that smaller companies paid higher dividends than their larger counterparts. Economists have traditionally suggested that large (and presumably mature) companies should pay higher

dividends as they have fewer investment opportunities.[21] On the other hand, small companies may pay higher dividends to reduce agency problems between shareholders and corporate insiders.[22] Our dividend evidence appears to be consistent with this latter interpretation.

<div align="center">INSERT FIGURE 4</div>

The large spike in dividend yield which occurs in the late 1840s is due mainly to the fall and subsequent recovery of railway prices. Figure 5 contains the monthly dividend yields for all non-railway companies in our sample. It is noteworthy that the large spike in yields in the late 1840s is not apparent in this figure. It is also noteworthy that the dividend yield is still consistently higher in the unweighted series.

<div align="center">INSERT FIGURE 5</div>

Dividend yields trend slightly upwards over the sample period, although this is less so for the weighted series which contain all companies. However, yields do begin to trend downwards in the late 1860s, and, according to Grossman this decline continues into the next decade.[23]

Figure 6 contains our monthly indices of total return, and Table 4 contains annual returns for each of our three portfolios as well as the value of the total returns index in December of each year. The extremely high terminal value of the unweighted index is largely attributable to the cumulative impact of the higher dividend yields earned by smaller companies. The index weighted by paid-up capital is always below that weighted

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[21] Smith and Watts, "Investment Opportunity Set"; Gaver and Gaver, "Additional Evidence"; Fama and French, "Disappearing Dividends."

[22] Easterbrook, "Two Agency Cost Explanations"; Jensen, "Agency costs."

[23] Grossman, "New Indices," p.135.

by market capitalization, and this is largely attributable to the higher capital appreciation of this latter series. Table 4 and Figure 6 show that the gap between the weighted and unweighted indices opened up after 1848, and this is attributable to both higher dividend yields and capital appreciation. This implies that after 1848, smaller stocks enjoyed greater capital gains as well as paying higher dividends, suggesting that if there is a small-firm effect, it became more apparent from the late 1840s. One could speculate that the failure of many small railway companies following the railway mania resulted in investors demanding a small-firm premium in this nascent market.

INSERT FIGURE 6 & TABLE 4

Table 5 contains summary statistics for annualised returns data for the British market in the period 1825-70. This table has two panels enabling us to see whether our findings are being driven by railways, the dominant sector in our sample. Several features of these summary statistics in Table 5 are worthy of note. Firstly, shareholders in this era received most of their returns through dividends rather than capital gains. Secondly, the higher returns on the unweighted portfolios suggest that there is a small-firm premium, although more rigorous analysis is required to demonstrate fully the existence of such an effect. Thirdly, it appears that railways, the dominant sector in our sample, paid lower dividends than other industries, although the return investors received through capital appreciation was slightly higher for the railways. Fourthly, the highest total stock-market returns in our sample period were produced in 1852 for the weighted returns and in 1845 for the unweighted returns, whereas 1825, 1826 and 1847 are the worst years. As can be seen from Table 5, the negative returns in 1847 are mainly as a result of the crash of the railway mania. Fifthly, although the number of years producing

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negative capital gains ranged from 10 to 18 depending on weighting method, high dividend yields meant that negative stock market returns were only experienced in three to five years depending on weighting methodology (1825, 26, 31, 47 and 53). Sixthly, the relatively high autocorrelation of the capital appreciation series suggests that many stocks were illiquid. Finally, comparing our stock-market return to inflation, which can be used as a proxy for the risk-free rate, is indicative of a very high equity premium in this period.[24]

INSERT TABLE 5

SURVIVORSHIP BIAS AND RETURNS

As is the case with most stock market indices, our indices are subject to survivorship bias. In other words, stock returns are overestimated because some companies in our sample may have become bankrupt. Typically, one cannot tell from the *Course of the Exchange* why a particular company delisted.[25] Companies delisted because of bankruptcy, mergers and acquisitions, name changes, going private or listing on another stock exchange. Apart from the railway sector, mergers weren't that common in this period. Lewin gives details of the railway mergers or name changes which occurred in the decades after the railway mania.[26] From this list, we identified 53 railways which disappeared from our sample because they merged with another company and three railways which disappeared because of name changes. All the shares issued by these

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[24] For the use of inflation as the risk-free rate, see Grossman and Ibbotson, *Equity Risk Premium*, p.34.

[25] From the *Course of the Exchange*, we were able to identify four dock and two insurance companies which disappeared because of mergers, and one insurance company which changed its name.

[26] Lewin, *Railway Mania*, pp.474-9.

companies are not counted as attrition. We used three strategies to deal with the remaining companies which disappeared from our sample.

The first attrition strategy treats all the remaining firms as having become bankrupt. The second attrition strategy requires that firms had to be in the market for at least 36 months before they could be considered as attrition, this strategy avoids counting firms as attrition which never fully established in the market.[27] The third attrition strategy takes into account that some firms delisted for reasons other than bankruptcy. As the *Investors' Monthly Manual*, which commenced publication in the mid-1860s, provides a comprehensive coverage of equity traded on British markets, we checked the December 1870 edition to see if any of the companies which disappeared from our sample were still in existence at the end of our sample period. There are 77 firms which disappeared from our dataset but were reported in the December 1870 edition of the *Investors' Monthly Manual*; many of these equities had simply moved their listing to a regional stock exchange. Consequently, these 77 companies are not counted as attrition. This third attrition strategy also requires that firms had to be listed for at least 36 months before they could be considered as attrition.

Within each attrition strategy, there were two ways we adjusted for survivorship bias. The lower bound adjustment viewed shareholders as suffering a -100 per cent return at delisting, and the capital appreciation and dividend yield of the shares were assumed to zero for the rest of our sample period. Information from a stock's last trading month (number of issued shares, price and paid-up capital) was used to calculate the relevant weighting factor. This could be viewed as a buy-and-hold survivorship bias

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[27] Grossman, "New Indices," pp.140-1.

adjustment. The upper bound adjustment was one which viewed shareholders as suffering a -100 per cent return and a zero dividend payment at delisting, with the stock disappearing from their portfolio at this date.

Table 6 reports the attrition-adjusted returns using our three methods. As one can clearly see, the first attrition strategy has the largest effect on our return estimates and the third strategy has the least severe impact. We also observe that attrition reduces the returns of the unweighted portfolios more than those of the weighted portfolios. This suggests that many of our delisting companies are small firms, which is not surprising given the higher probability of bankruptcy usually associated with such firms. Notably, the lower bound attrition method has a greater impact, relatively speaking, on capital appreciation.

INSERT TABLE 6

After accounting for attrition using the lower bound methods, one can see from Table 6 that dividends now constitute a greater proportion of total return. Indeed, apart from the market capitalization weighted returns, annual capital appreciation is very close to zero. This suggests that shareholders enjoyed capital appreciation mainly on large stocks. Interestingly, after taking account of attrition, the unweighted dividend yields are still larger than the weighted returns, suggesting that smaller stocks have higher dividend yields.

Figure 7 plots indices of total returns weighted by market capitalization. One can see that over the sample period, attrition has a substantial impact on the total return indices. Nevertheless, even using the estimate from the most severe attrition

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methodology, investors still enjoy a substantial return over this time period as the total return index grows 2,458 per cent by 1870.

INSERT FIGURE 7

THE COMPARATIVE PERFORMANCE OF THE 1825-70 EQUITY MARKET

Table 7 compares the returns on the British equity market in the 1825-70 period with those of the U.S. in the same period and with later epochs in the British market. Although such comparisons help place the performance of the 1825-70 British equity market in context, they should be made circumspectly due to possible differences in construction, constituents and survivorship bias.

INSERT TABLE 7

Comparing the unweighted returns for Britain with those for the US, it is noteworthy that even the low-dividend real return estimate for the US is higher than that of Britain. However, the US market was a less-developed financial market at this point in time, and it had a lot more risk than the British market as can be seen from the higher coefficient of variation. Alternatively, the high capital appreciation for the US could be due to the upward bias induced by the bid-ask bounce which arises due to infrequently traded stocks.[28] As price or capitalization weighted returns to a large extent eliminate this bias, it may be more illuminating to compare the weighted returns for the US and Britain. Comparing weighted returns, we note that the average annual real returns are higher in Britain even though this market was less risky as measured by the coefficient of

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[28] Goetzmann, *et al*, "New Historical Database."

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variation. Notably, in both markets, dividend returns are the major component of total returns, which is the converse of what we observe in modern equity markets.[29]

As we can see from Panels C and D of Table 7, total real returns are lower in both the 1872-1913 and 1946-99 periods than in the period 1825-70. One possible explanation for this is that the market was less risky in this post-1870 period, but the coefficients of variation suggest that the market was marginally riskier in the later periods. This appears somewhat paradoxical given that uncalled capital was a common feature of many companies up until the 1870s.[30] Indeed, many banks and insurance companies had unlimited liability, which can be viewed as an extreme form of uncalled capital callable only in the event that the firm enters bankruptcy. However, the existence of uncalled capital may have acted as a substantial check on management risk-taking behaviour, reducing the riskiness of stocks carrying uncalled capital. Uncalled capital was less prevalent in the British equity market after the 1870s,[31] and therefore the check on managerial risk-taking behaviour was removed in some cases.

Another possibility as to why total real returns are lower in the two latter periods is that the stock-market is simply reflecting Britain's industrial hegemony and its subsequent decline. As is well–known, 1825-70 was the period when Britain was at the peak of its industrial power, enjoying above market rates of return due to it being the first industrial nation. Also, as a result of imperial expansion, companies enjoyed high profit streams as demonstrated by high dividend payments. Contrastingly, the period after 1870

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[29] Fama and French, "Disappearing Dividends."

[30] Jefferys, "Denomination"; *Business Organisation*.

[31] Jefferys, "Denomination."

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was one where Britain increasingly faced competition from imperial rivals, and this could explain the relative performance of the equity market in this period, particularly in the form of reduced dividend payments. It is believed by some economists that the British industrial economy failed in the post-1870 period,[32] and this failure may be reflected in the relative performance of the equity market. However, the high rates of return for investors in the period 1825-70 translate into high costs of capital for companies, and in an efficient capital market, such high returns should be competed away. This implies that there may have been inefficiencies or barriers to entry in the capital market at this time. Four possible candidates are suggested below.

One possible candidate is that the presence of extended shareholder liability and the existence of high share denominations substantially increased the costs to investors of diversification. Therefore, companies have to compensate investors for this risk. Notably, shareholder liability extensions and high share denominations effectively disappeared in the years after 1870.[33]

Another possible candidate is that high returns were demanded by investors in the period 1825-70 because investor protection and corporate governance structures were weak. The subsequent strengthening of corporate and securities law, the development of the market for corporate control, the development of corporate governance norms and the increased vigilance of the financial press may have reduced the cost of equity capital. In particular, the high dividends in the period 1825-70 may have been acting as a substitute for legal protection.

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[32] McCloskey, "Victorian Britain."

[33] Jefferys, "Denomination"; *Business Organisation*.

Yet another possible explanation for the large difference in returns between the period 1825-70 and subsequent periods is that a large proportion of potential loanable funds in pre-1870 Britain were tied up in land. However, Liberal legislation in and after the 1880s began an attack on the landed interests, with the possibly unintended consequence that there was a general movement by landowners and the gentry to spread their investments away from land into the equity market.[34] This large movement of funds out of land and into equity may have resulted in the substantial fall in the cost of capital.

A final candidate which may explain the high returns (and especially the high dividend returns) in the period 1825-70 is that financial markets were highly illiquid in this period, making it prohibitively costly for investors to realize some of their capital gains by selling a proportion of their stock. The high return paid to investors was therefore a reward for illiquidity risk.

CONCLUSIONS

Using data from the *Course of the Exchange*, we have constructed the first ever monthly returns series for the British equity market which covers the period 1825-70. These series contain capital appreciation and dividends, and are weighted using different weights. We have adjusted these series for potential survivorship bias by using various attrition strategies.

When the returns on the British equity market in the period 1825-70 are compared to the US or later eras in the British market, we observed that the returns on the British market in the 1825-70 period were higher, and that this cannot be explained by risk.

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[34] Atiyah, *Rise and Fall*, p.585; Thompson, *English Landed Society*, pp.307-8.

Although this success could be explained by differences in construction, constituents and survivorship bias, we suggest that the success of the British market at this time may simply be mirroring Britain's hegemonic industrial power as well as reflecting inefficiencies in the capital market. However, this issue requires more research. In particular, the political economy of capital market inefficiencies may prove a fruitful avenue for future research.

Our findings also suggest that the bulk of stockholder returns in this period came from dividends rather than capital gains. Indeed, when we adjusted for survivorship bias, we found that practically all the return to stockholders came from dividends rather than capital appreciation. This, of course, is the reverse of the modern-day stock-market, where, relatively speaking, dividends have disappeared. Future research should attempt to explain the long-term evolution of dividends in Britain.

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TABLE 1

AN ANALYSIS OF THE COMPANIES AND SECURITIES INCLUDED IN AND
EXCLUDED FROM OUR INDICES

Industry	No. companies included in index	No. securities included in index	Duration of security listing (months)		Percentage of months when stock price is reported		No. securities excluded due to being listed for ≤ 12 months	No. securities excluded due to insufficient data[1]
			mean	median	mean	median		
Railways	180	329	86.9	56.5	74.3	85.3	160	67
Miscellaneous	132	142	99.7	55.0	56.6	58.6	90	87
Banks	111	138	100.2	57.0	72.1	82.4	52	11
British Mines	75	75	98.5	79.5	51.5	51.5	17	11
Insurance	72	79	233.3	171.0	63.8	67.5	6	25
Canals	63	65	294.9	267.0	75.1	76.3	1	6
Foreign Mines	58	59	87.6	45.0	68.2	75.4	18	14
Gas, Light & Coke	48	69	176.9	126.0	58.8	62.5	14	32
Docks	15	16	229.1	160	73.6	69.8	3	8
Telegraph	14	15	54.8	38.0	77.7	95.7	4	2
Waterworks	14	18	250.9	211.0	74.1	79.3	1	9
Bridges	5	5	351.2	452.0	71.1	72.0	1	1
Roads	4	5	126.4	132.0	50.8	41.7	0	2
Overall sample	681	1,015	127.9	77.0	67.6	73.8	367	275

Notes: [1] If less than 10% of months had prices reported, the security was excluded. Companies with no capitalization data were also excluded.
Source: see text.

TABLE 2
BREAKDOWN OF THE SECTORS CONTAINED IN THE STOCK MARKET INDICES (PERCENTAGE OF ISSUE AND MARKET CAPITALIZATION [MC])

	Banks		Insurance		Canals		Railways		Mining		Other	
	Issues	MC	Issues	MC	Issues	MC	Issues	MC	Issues	MC	Issues	MC
1825	1.16	0.34	16.76	16.85	26.59	49.17	1.16	0.33	10.98	2.35	43.34	30.95
1826	1.72	1.14	16.67	19.16	29.31	47.54	0.57	0.29	8.62	2.91	43.10	28.97
1827	1.13	1.57	16.38	19.00	33.90	43.48	1.69	1.00	6.21	3.10	40.66	31.85
1828	1.16	1.40	15.61	19.25	35.84	43.45	1.73	1.67	5.78	1.58	39.87	32.66
1829	1.18	1.47	17.06	20.08	35.29	42.63	1.76	2.43	5.88	1.56	38.82	31.83
1830	1.18	1.88	17.16	19.99	34.91	40.89	1.78	3.37	5.91	1.60	39.06	32.26
1831	1.19	1.91	16.67	19.81	35.12	41.65	1.79	3.94	4.76	1.70	40.47	31.01
1832	1.18	1.55	16.57	20.18	34.91	41.19	2.37	3.64	4.73	1.96	40.24	31.49
1833	1.71	1.99	16.00	20.36	33.14	38.80	4.57	5.65	5.15	3.85	39.44	29.37
1834	3.26	3.75	15.76	20.31	31.52	37.94	5.43	6.76	5.98	3.12	38.03	28.11
1835	6.82	10.37	14.09	17.82	26.82	31.17	10.45	12.52	6.82	3.31	35.01	24.80
1836	9.21	14.11	13.39	16.05	24.27	27.13	14.64	16.78	7.11	3.41	31.38	22.52
1837	10.43	15.03	14.35	15.82	24.78	27.58	12.61	17.77	5.65	2.89	32.17	20.90
1838	11.69	15.07	15.15	14.16	24.24	23.40	14.72	23.25	5.62	3.69	28.57	20.44
1839	10.73	12.44	15.88	13.98	24.03	23.11	15.45	26.07	5.58	2.95	28.33	21.45
1840	10.34	12.48	17.67	12.65	22.84	19.01	16.81	34.23	5.18	2.82	27.15	18.81
1841	9.79	11.99	17.45	12.06	22.98	18.24	19.57	36.77	4.68	1.17	25.53	19.76
1842	9.38	10.39	18.30	11.57	21.88	16.58	20.09	39.23	4.46	1.12	25.90	21.11
1843	8.22	8.84	18.26	10.23	21.92	14.58	21.00	44.17	4.11	0.82	26.49	21.35
1844	7.17	7.60	16.14	8.97	20.63	11.99	30.04	51.92	4.04	0.92	21.98	18.60
1845	6.67	6.53	12.50	8.06	14.58	8.17	44.58	59.78	3.33	1.51	18.33	15.96
1846	6.96	6.59	13.48	8.00	12.17	6.14	46.96	63.16	3.04	1.18	17.38	14.93
1847	6.32	5.52	11.46	6.81	11.07	5.32	51.38	68.39	3.56	0.97	16.21	12.98
1848	6.02	5.15	11.28	6.65	10.15	5.01	53.76	71.07	3.01	0.73	15.80	11.39
1849	6.43	6.64	12.45	8.84	10.84	6.14	49.80	63.08	3.21	1.04	17.26	14.27
1850	7.80	6.76	15.60	8.94	11.93	5.46	41.28	64.44	4.13	0.99	19.25	13.41
1851	7.69	7.86	16.29	9.43	11.76	5.09	36.65	61.21	5.88	1.32	21.71	15.10
1852	9.17	8.61	15.42	8.16	10.83	4.20	30.42	61.36	11.66	3.27	22.50	14.39
1853	9.20	11.21	14.94	8.86	9.58	4.42	28.74	57.45	13.02	2.39	24.52	15.68
1854	9.34	11.63	15.56	8.19	9.73	4.16	28.40	58.34	11.67	1.62	25.29	16.05
1855	11.39	13.57	16.88	8.26	8.86	3.89	26.58	55.25	9.70	1.58	26.59	17.46
1856	12.71	12.95	15.25	7.67	8.90	3.47	26.27	57.52	7.62	1.28	29.23	17.12
1857	11.46	11.95	13.83	8.63	5.93	3.18	24.11	57.72	16.20	1.96	28.46	16.58
1858	11.84	12.23	14.29	8.53	4.49	2.63	24.08	58.64	16.73	1.76	28.57	16.20
1859	11.62	13.33	14.52	8.65	2.90	2.45	21.99	58.69	19.92	1.93	29.04	14.95
1860	12.08	13.36	14.17	8.70	2.08	1.82	21.67	60.29	19.59	1.92	30.42	13.91
1861	11.89	13.89	14.75	8.77	2.05	1.80	21.72	59.05	19.67	2.14	29.92	14.33
1862	14.67	15.44	13.90	8.62	1.54	1.68	22.39	57.46	18.53	2.29	28.95	14.52
1863	21.25	18.98	13.94	8.39	1.39	1.53	18.82	53.18	14.64	1.91	29.97	16.02
1864	22.22	20.69	13.33	7.44	1.27	1.29	15.87	52.06	14.29	1.76	33.01	16.76
1865	21.60	21.09	12.65	6.79	1.23	1.25	15.43	50.77	13.89	1.77	35.19	18.33
1866	20.46	18.05	13.53	6.58	1.32	1.33	14.85	54.64	11.88	1.26	37.95	18.14
1867	19.72	18.42	13.84	7.52	1.04	0.61	14.53	53.67	12.46	1.47	38.41	18.31
1868	20.34	18.82	13.79	7.13	1.03	0.58	14.83	52.76	12.07	1.19	37.92	19.52
1869	19.86	18.20	13.70	6.82	0.68	0.48	14.73	51.56	11.30	1.05	39.73	21.88
1870	20.79	17.80	13.98	6.95	0.72	0.44	15.05	54.66	11.11	1.04	38.34	19.11

Source: see text.

TABLE 3
CORRELATION OF NEW INDICES WITH EXISTING INDICES

	Gayer *et al* index	Hayek's index	Index weighted by market capitalization	Index weighted by paid-up capital	Unweighted index
Gayer *et al* index	1.000				
Hayek's index	0.548	1.000			
Index weighted by market capitalization	-0.284	0.674	1.000		
Index weighted by paid-up capital	-0.084	0.720	0.990	1.000	
Unweighted index	-0.284	0.675	0.988	0.968	1.000

TABLE 4
ANNUAL STOCK-MARKET RETURNS, 1825-70

	Weighted by market capitalization				Weighted by paid-up capital				Unweighted			
	Capital appreciation	Dividend yield	Total return	Index value at Dec.	Capital appreciation	Dividend yield	Total return	Index value at Dec.	Capital appreciation	Dividend yield	Total return	Index value at Dec.
1825	-6.40	2.72	-3.68	96.32	-12.13	2.54	-9.59	90.41	-19.00	2.07	-16.93	83.07
1826	-8.03	5.20	-2.82	93.60	-12.83	5.42	-7.41	83.71	-9.79	5.67	-4.13	79.64
1827	2.19	5.79	7.98	101.07	0.75	6.09	6.85	89.44	0.04	7.01	7.05	85.26
1828	0.10	5.64	5.74	106.87	-3.75	5.61	1.86	91.11	-1.83	6.65	4.82	89.37
1829	2.01	5.88	7.89	115.30	0.92	6.28	7.20	97.67	1.00	7.69	8.69	97.14
1830	-4.78	5.37	0.59	115.99	-3.89	5.17	1.28	98.91	1.80	7.54	9.34	106.21
1831	-4.95	6.19	1.24	117.43	-6.04	5.86	-0.18	98.74	-4.86	7.68	2.82	109.21
1832	6.49	8.30	14.79	134.79	8.07	8.43	16.50	115.02	5.44	10.69	16.13	126.82
1833	7.34	7.74	15.07	155.11	8.31	7.54	15.85	133.25	10.82	9.36	20.18	152.42
1834	2.90	7.38	10.28	171.06	0.56	6.84	7.39	143.11	2.36	8.13	10.50	168.42
1835	7.30	8.21	15.51	197.59	4.07	7.46	11.53	159.60	2.91	8.36	11.27	187.40
1836	11.13	8.55	19.68	236.48	6.03	7.70	13.73	181.52	4.44	8.62	13.07	211.89
1837	5.69	8.53	14.22	270.10	2.64	7.94	10.58	200.73	8.79	9.57	18.35	250.77
1838	12.18	8.49	20.66	325.91	9.78	7.87	17.65	236.17	10.36	10.19	20.55	302.32
1839	-1.28	8.10	6.82	348.14	-4.20	7.12	2.92	243.06	2.07	9.54	11.61	337.42
1840	8.97	8.34	17.31	408.42	5.02	7.49	12.51	273.46	1.67	9.85	11.52	376.30
1841	-2.07	7.68	5.61	431.32	-4.24	7.23	3.00	281.66	-0.42	10.42	10.00	413.93
1842	5.25	8.37	13.62	490.07	1.60	7.57	9.18	307.51	1.38	10.51	11.89	463.13
1843	16.01	8.29	24.30	609.16	15.79	8.01	23.81	380.72	7.78	11.19	18.97	550.99
1844	13.56	7.21	20.78	735.71	15.35	7.10	22.45	466.17	11.75	10.73	22.48	674.84
1845	20.07	6.53	26.60	931.41	15.42	6.48	21.90	568.26	26.57	10.13	36.70	922.52
1846	2.57	5.71	8.28	1,008.55	-1.45	5.54	4.08	591.46	3.27	8.27	11.54	1,028.97
1847	-15.70	5.83	-9.87	909.01	-20.66	6.96	-13.70	510.46	-14.13	10.64	-3.49	993.02
1848	-2.76	8.56	5.79	961.68	-4.74	12.49	7.74	549.98	2.85	24.12	26.97	1,260.85
1849	-2.44	9.00	6.56	1,024.77	-9.88	11.81	1.93	560.61	7.45	21.36	28.81	1,624.08
1850	18.68	10.37	29.06	1,322.53	21.76	15.46	37.22	769.26	15.61	21.04	36.65	2,219.33

TABLE 4 (CONT.)

	Weighted by market capitalization				Weighted by paid-up capital				Unweighted			
	Capital appreciation	Dividend yield	Total return	Index value at Dec.	Capital appreciation	Dividend yield	Total return	Index value at Dec.	Capital appreciation	Dividend yield	Total return	Index value at Dec.
1851	7.36	6.85	14.21	1,510.49	7.17	6.88	14.05	877.32	9.17	12.73	21.89	2,705.17
1852	29.14	7.39	36.52	2,062.16	32.82	7.24	40.06	1,228.74	38.77	14.45	53.23	4,145.06
1853	-7.56	5.55	-2.01	2,020.71	-11.66	4.49	-7.17	1,140.64	-5.34	10.42	5.08	4,355.74
1854	0.83	7.46	8.29	2,188.26	-2.81	5.63	2.82	1,172.85	-1.13	12.63	11.51	4,856.88
1855	4.17	8.04	12.21	2,455.44	1.94	5.96	7.90	1,265.46	3.68	15.07	18.76	5,767.80
1856	14.02	8.59	22.61	3,010.53	16.45	6.95	23.40	1,561.60	8.05	16.37	24.42	7,176.24
1857	-3.32	7.86	4.54	3,147.23	-4.63	6.38	1.75	1,588.88	-3.78	12.57	8.79	7,806.96
1858	12.31	8.50	20.81	3,802.16	10.08	7.02	17.10	1,860.53	9.87	13.27	23.14	9,613.58
1859	5.54	6.99	12.53	4,278.39	4.55	6.04	10.59	2,057.62	10.22	10.08	20.30	11,565.34
1860	6.66	7.38	14.03	4,878.78	6.73	6.63	13.36	2,332.61	4.71	8.98	13.69	13,148.93
1861	-2.27	6.80	4.53	5,099.87	-0.98	6.74	5.75	2,466.83	8.09	11.01	19.11	15,661.05
1862	9.32	7.22	16.54	5,943.27	7.52	6.43	13.95	2,810.93	12.82	10.25	23.07	19,273.96
1863	9.37	7.70	17.07	6,957.82	7.39	6.32	13.71	3,196.28	9.67	9.57	19.24	22,982.10
1864	9.29	8.94	18.23	8,226.25	6.47	7.35	13.82	3,638.15	9.25	13.04	22.29	28,105.74
1865	3.04	10.01	13.05	9,299.65	-0.63	8.31	7.68	3,917.66	3.87	17.70	21.58	34,170.10
1866	-3.52	10.59	7.08	9,957.62	-7.79	10.73	2.94	4,032.80	-4.37	19.69	15.31	39,403.09
1867	-3.23	9.73	6.51	10,605.50	-5.73	9.89	4.17	4,200.82	6.06	19.43	25.49	49,445.61
1868	5.56	9.02	14.58	12,151.83	6.10	8.05	14.14	4,794.93	12.39	16.85	29.23	63,900.76
1869	7.68	9.40	17.08	14,227.41	5.78	8.02	13.80	5,456.56	9.42	17.38	26.80	81,023.90
1870	8.08	9.19	17.27	16,684.35	6.04	7.71	13.74	6,206.54	13.01	16.67	29.68	105,074.68

Note: Index is total market returns, I_t^{MR}.

TABLE 5
SUMMARY STATISTICS FOR ANNUAL STOCK-MARKET RETURNS, 1825-70

	Arithmetic Mean (%)	Geometric Mean (%)	Standard deviation (%)	Maximum return (%)	Minimum return (%)	Percent ≥ 0 (%)	Autocorrelation (%)
PANEL A: INCLUDING RAILWAYS							
Capital appreciation							
Weighted by paid-up capital	2.55	2.10	9.74	32.82g	-20.66d	60.87	24.29
Weighted by market capitalization	4.49	4.17	8.35	29.14g	-15.70d	69.57	22.53
Unweighted	5.06	4.66	9.35	38.77g	-19.00a	78.26	20.56
Dividend yield							
Weighted by paid-up capital	7.32	7.30	2.09	15.46f	2.54a	100.00	95.73
Weighted by market capitalization	7.63	7.62	1.55	10.59h	2.72a	100.00	96.56
Unweighted	11.85	11.76	4.58	24.12e	2.07a	100.00	96.28
Total return							
Weighted by paid-up capital	9.87	9.39	10.42	40.06g	-13.70c	89.13	24.21
Weighted by market capitalization	12.12	11.77	9.03	36.52g	-9.87d	91.30	22.86
Unweighted	16.91	16.33	11.73	53.23g	-16.93a	93.48	24.21
PANEL B: EXCLUDING RAILWAYS							
Capital appreciation							
Weighted by paid-up capital	2.17	1.89	7.63	28.86g	-12.89b	65.22	20.07
Weighted by market capitalization	3.90	3.69	6.83	28.93g	-8.24b	76.09	25.91
Unweighted	3.57	3.27	7.96	30.57g	-19.08a	73.91	18.46
Dividend yield							
Weighted by paid-up capital	9.68	9.63	3.13	20.31h	2.55a	100.00	95.72
Weighted by market capitalization	10.35	10.31	3.06	17.44h	2.72a	100.00	98.06
Unweighted	12.68	12.60	4.42	22.44h	2.08a	100.00	97.43
Total return							
Weighted by paid-up capital	11.84	11.49	8.96	38.91g	-9.59a	91.30	22.57
Weighted by market capitalization	14.25	13.94	8.53	39.63g	-3.67a	95.65	29.73
Unweighted	16.25	15.76	10.61	45.17g	-17.00a	95.65	24.23
INFLATION	0.03	0.00	6.71	17.40e	-12.10a	47.83	22.93

Source: Inflation data is from O'Donoghue *et al*, "Composite Price Index."
Note: a = 1825; b= 1826; c = 1845; d= 1847; e = 1848; f=1850; g = 1852; h = 1866; i = 1868. Autocorrelation figures for the stock indices are based on monthly return data.

TABLE 6

AVERAGE ANNUAL STOCK-MARKET RETURNS AFTER ATTRITION
ADJUSTMENTS, 1825-70

	Capital appreciation (%)	Dividend yield (%)	Total return (%)
PANEL A: MARKET CAPITALIZATION WEIGHTED			
Return without taking account of attrition	4.49	7.63	12.12
Attrition strategy 1			
Upper bound	2.53	7.49	10.01
Lower bound	1.54	5.83	7.38
Attrition strategy 2			
Upper bound	3.04	7.53	10.57
Lower bound	1.86	6.02	7.88
Attrition strategy 3			
Upper bound	3.30	7.55	10.85
Lower bound	2.03	6.13	8.16
PANEL B: PAID-UP CAPITAL WEIGHTED			
Return without taking account of attrition	2.55	7.32	9.87
Attrition strategy 1			
Upper bound	0.32	7.16	7.48
Lower bound	-0.32	5.47	5.15
Attrition strategy 2			
Upper bound	0.94	7.21	8.15
Lower bound	0.01	5.68	5.68
Attrition strategy 3			
Upper bound	1.21	7.23	8.44
Lower bound	0.15	5.77	5.92
PANEL C: UNWEIGHTED			
Return without taking account of attrition	5.06	11.85	16.91
Attrition strategy 1			
Upper bound	-0.18	11.26	11.08
Lower bound	-0.45	6.01	5.56
Attrition strategy 2			
Upper bound	1.80	11.48	13.28
Lower bound	0.37	6.86	7.23
Attrition strategy 3			
Upper bound	2.45	11.56	14.01
Lower bound	0.68	7.11	7.79

TABLE 7
COMPARISON OF ANNUAL AVERAGE RETURNS WITH UNITED STATES AND
POST-1870 BRITAIN

	Capital appreciation (%)	Dividend yield (%)	Nominal total return (%)	Real total return (%)
PANEL A: BRITAIN 1825-1870				
Market capitalization weighted	4.49	7.63	12.12	12.74
	(1.86)	*(0.20)*	*(0.74)*	*(1.02)*
Paid-up capital weighted	2.55	7.32	9.87	10.56
	(3.83)	*(0.29)*	*(1.06)*	*(1.38)*
Unweighted	5.06	11.85	16.91	17.63
	(1.85)	*(0.39)*	*(0.69)*	*(0.89)*
PANEL B: UNITED STATES 1825-1870				
Price weighted (high dividend estimate)	2.19	9.34	11.53	10.71
	(7.53)	*(0.42)*	*(1.50)*	*(1.64)*
Price weighted (low dividend estimate)	2.19	3.78	5.97	5.17
	(7.53)	*(0.38)*	*(2.82)*	*(3.21)*
Unweighted (high dividend estimate)	13.43	9.34	22.77	22.10
	(2.38)	*(0.42)*	*(1.44)*	*(1.56)*
Unweighted (low dividend estimate)	13.43	3.78	17.21	16.56
	(2.38)	*(0.38)*	*(1.87)*	*(2.03)*
PANEL C: BRITAIN 1872-1913				
Market capitalization weighted	2.84	3.48	6.33	6.39
	(1.64)	*(0.13)*	*(0.74)*	*(1.08)*
Paid-up capital weighted	1.79	2.68	4.47	4.53
	(4.13)	*(0.14)*	*(1.64)*	*(1.79)*
Unweighted	1.31	5.46	6.77	6.83
	(4.69)	*(0.11)*	*(0.90)*	*(1.05)*
PANEL D: BRITAIN 1946-1999				
Unweighted	11.39	5.13	16.52	10.26
	(2.22)	*(0.28)*	*(1.50)*	*(2.55)*

Source: Returns on British market 1872-1913 and 1946-1999 are from Grossman, "New Indices." Returns on US market are calculated from data reported in Goetzmann *et al*, "New Historical Database." Inflation data to calculate real returns was obtained from O'Donoghue *et al*, "Composite Price Index" for Britain and Officer and Williamson, "Annual Inflation Rates" for the United States.
Note: Coefficient of variation is in parenthesis.
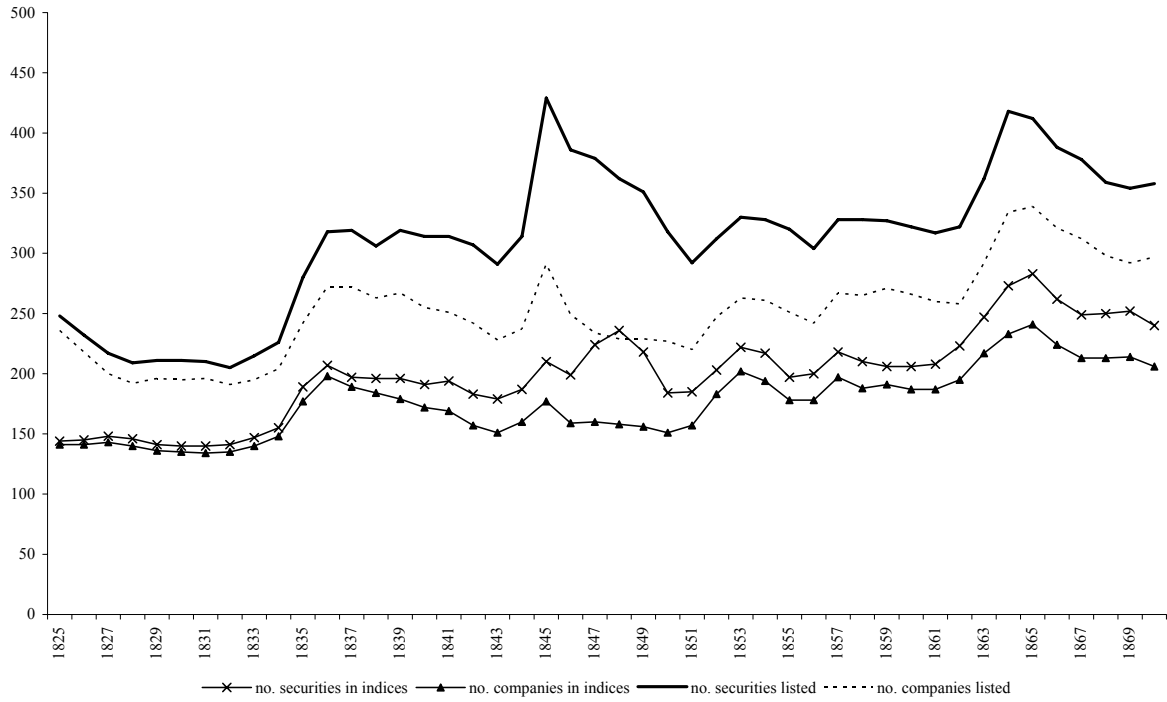
Figure 1
NUMBER OF COMPANIES AND EQUITY SECURITIES IN INDICES AND LISTED
IN COURSE OF EXCHANGE AT END OF YEAR, 1825-1870
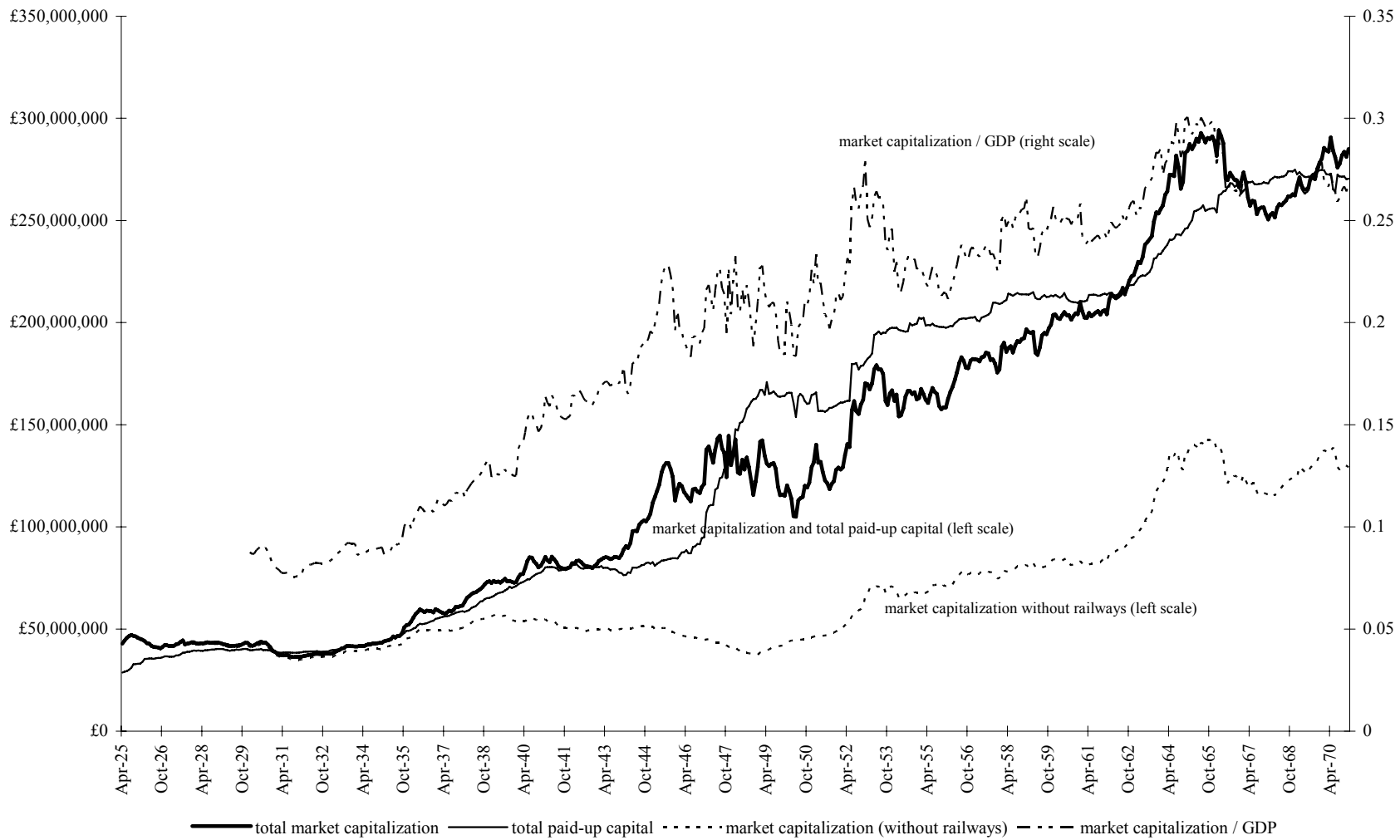
FIGURE 2
MONTHLY MARKET CAPITALIZATION, 1825-1870
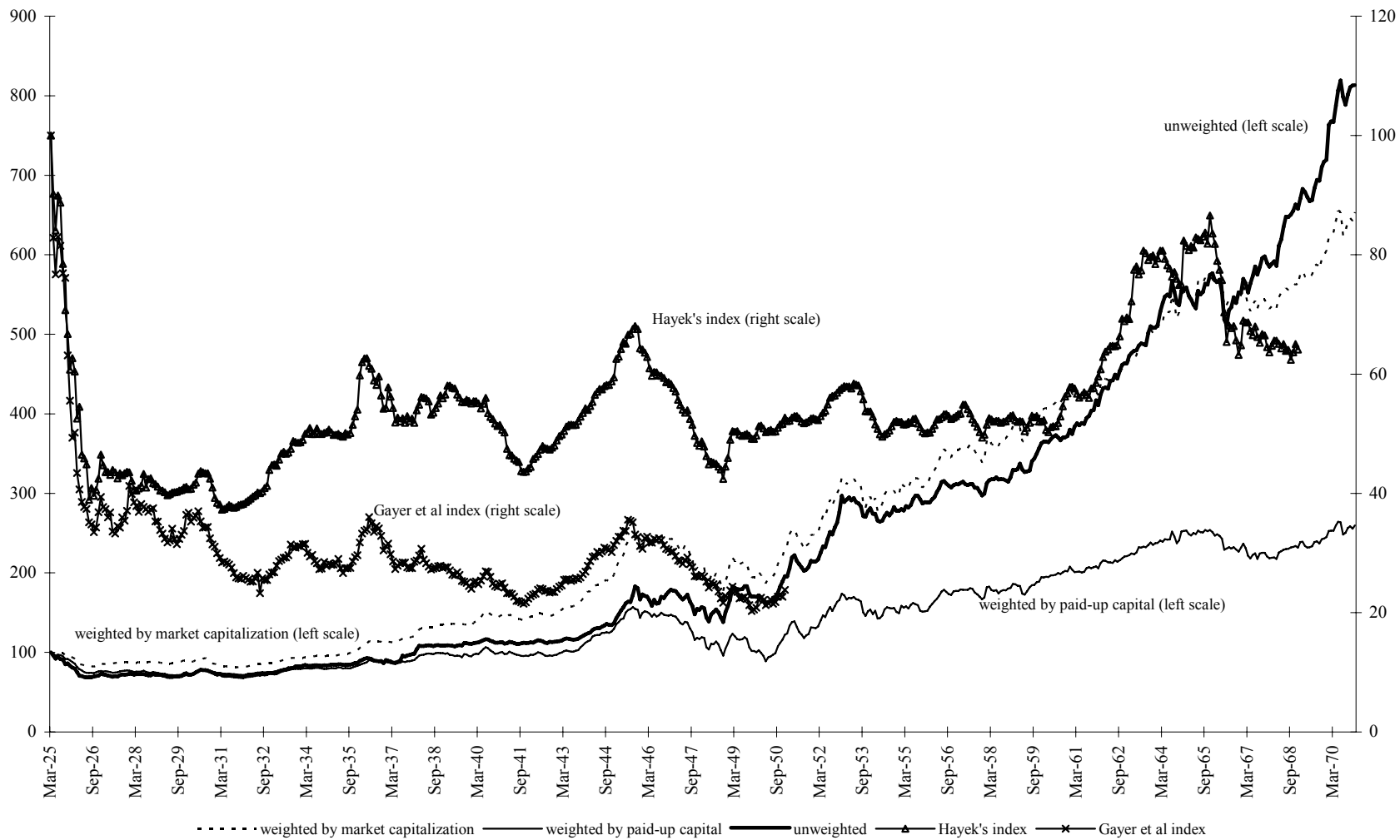
FIGURE 3
MONTHLY INDICES OF CAPITAL APPRECIATION, 1825-1870

FIGURE 4
MONTHLY DIVIDEND YIELDS FOR ALL INDUSTRIES, 1825-1870

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FIGURE 5
MONTHLY DIVIDEND YIELDS FOR NON-RAILWAY COMPANIES, 1825-1870

FIGURE 6
MONTHLY INDICES OF TOTAL RETURN (LOGARITHMIC SCALE), 1825-1870

FIGURE 7
MONTHLY INDICES OF TOTAL RETURN WEIGHTED BY MARKET CAPITALIZATION, 1825-1870

APPENDIX TABLE 1
MONTHLY CAPITAL APPRECIATION INDICES

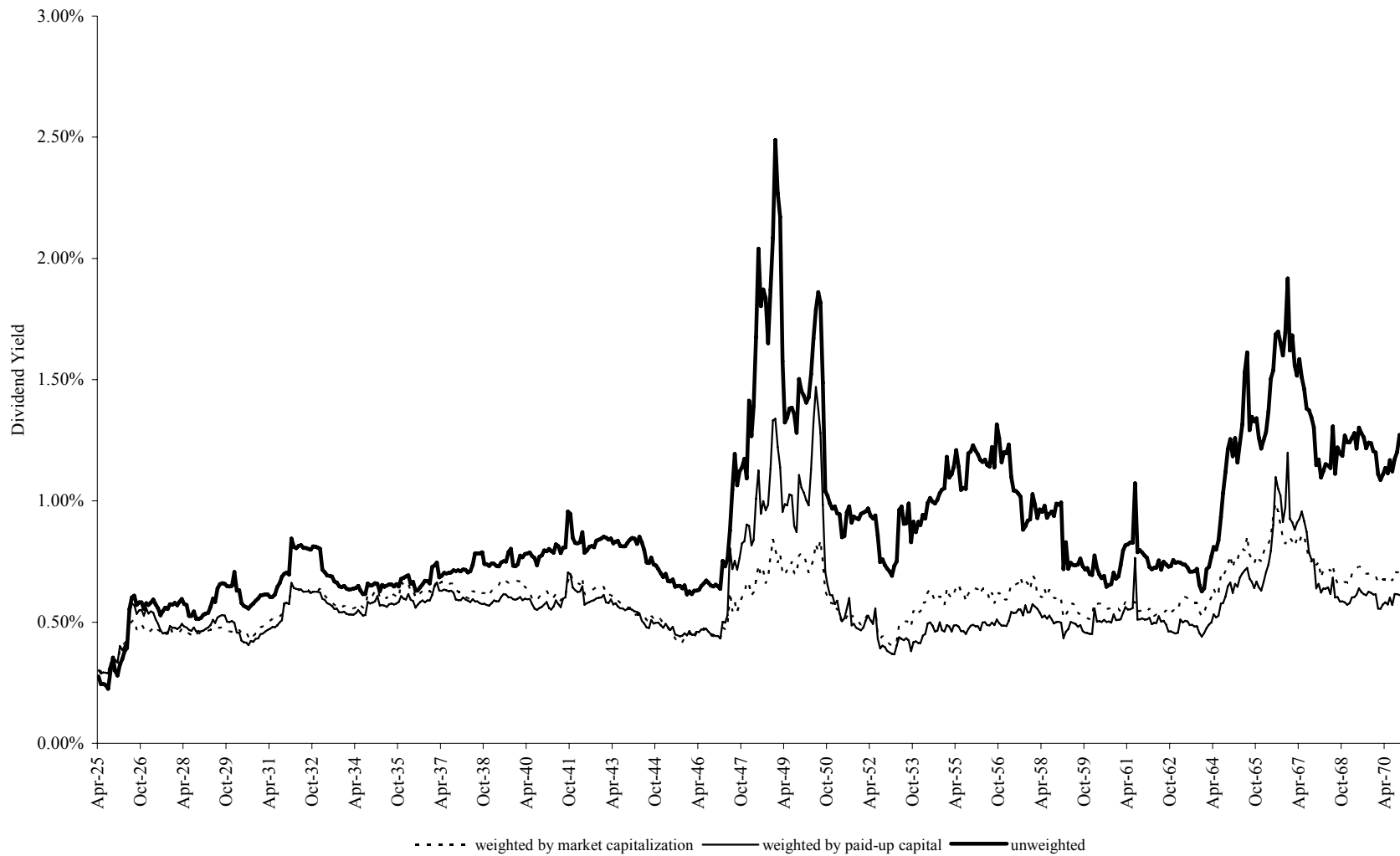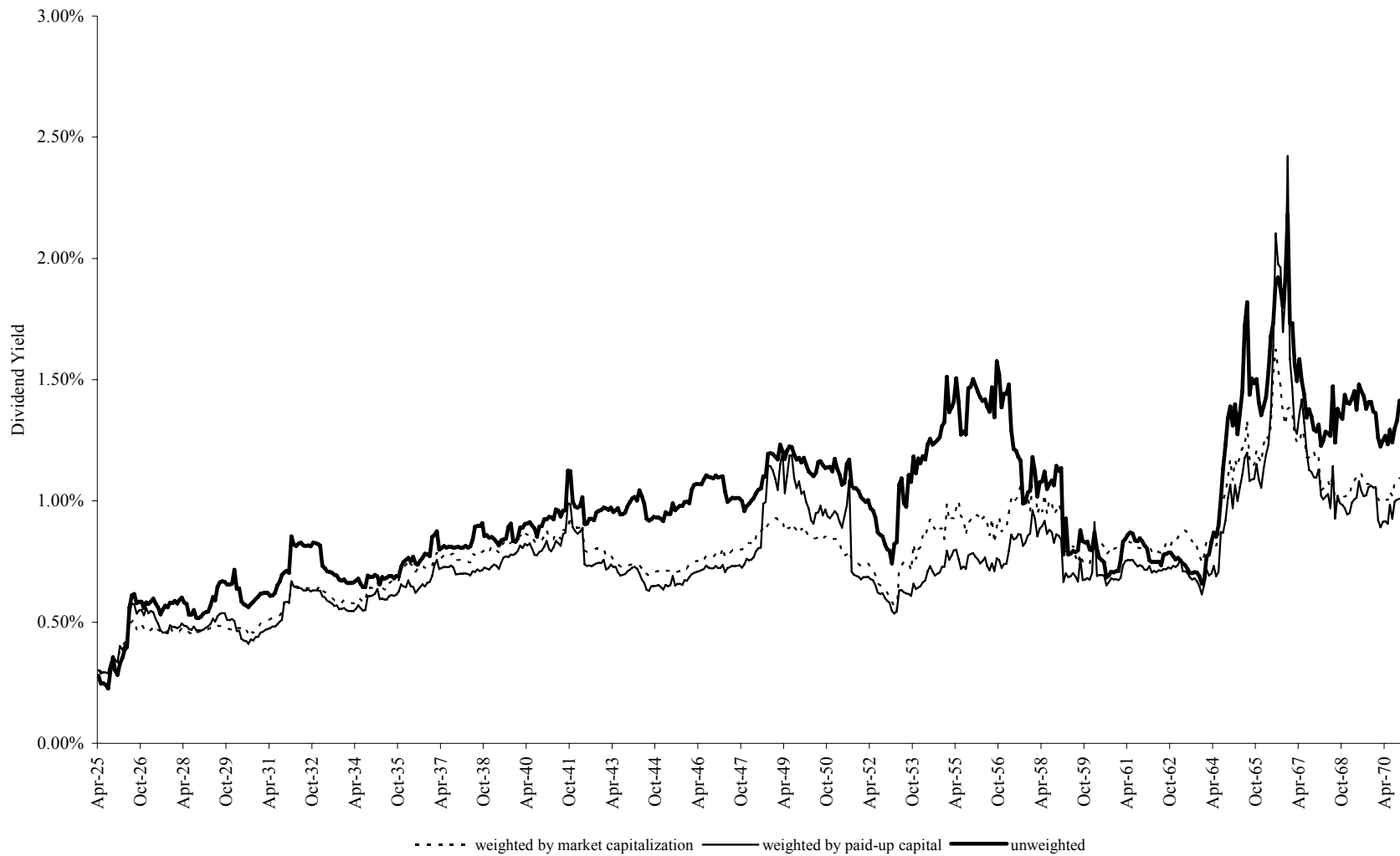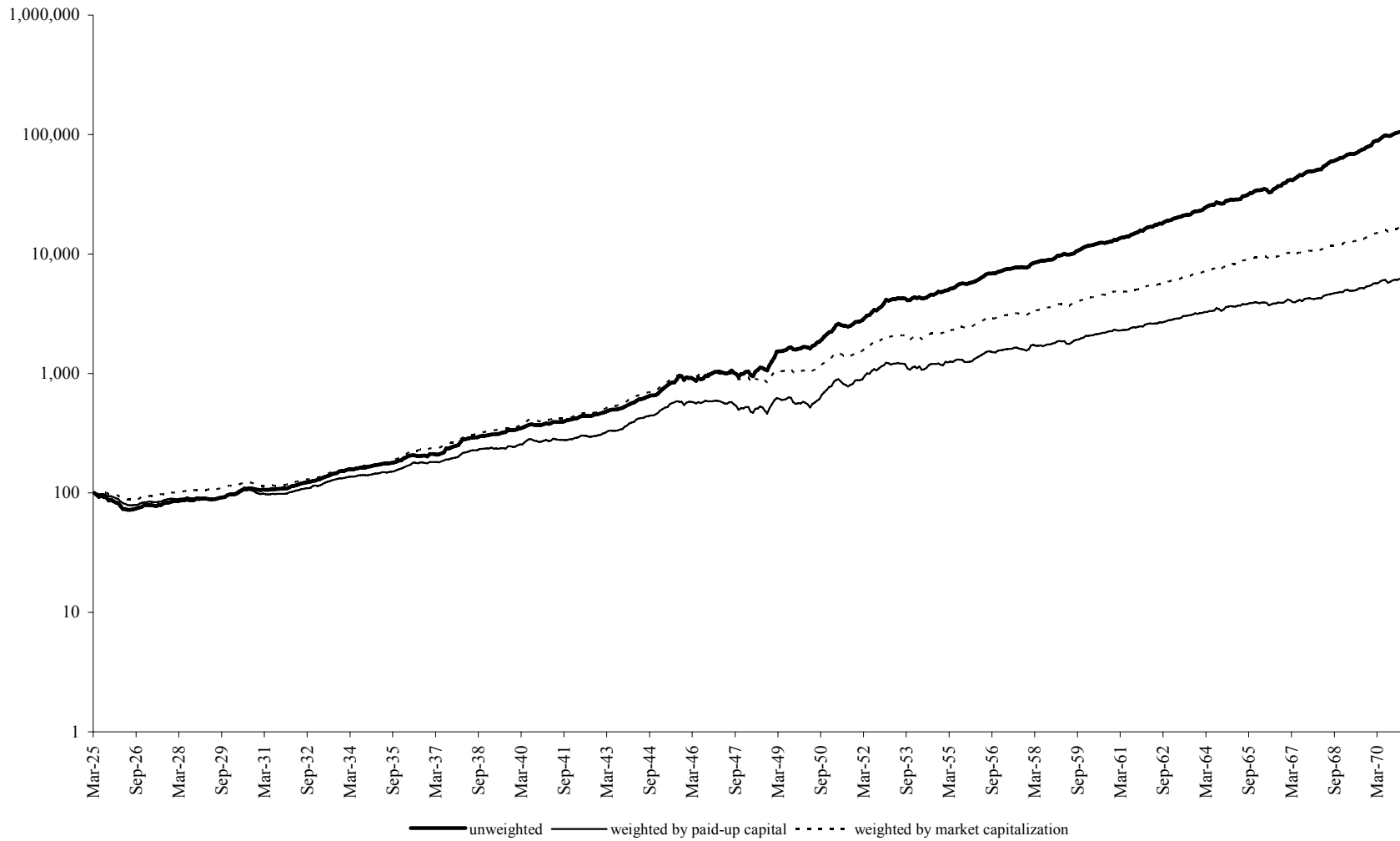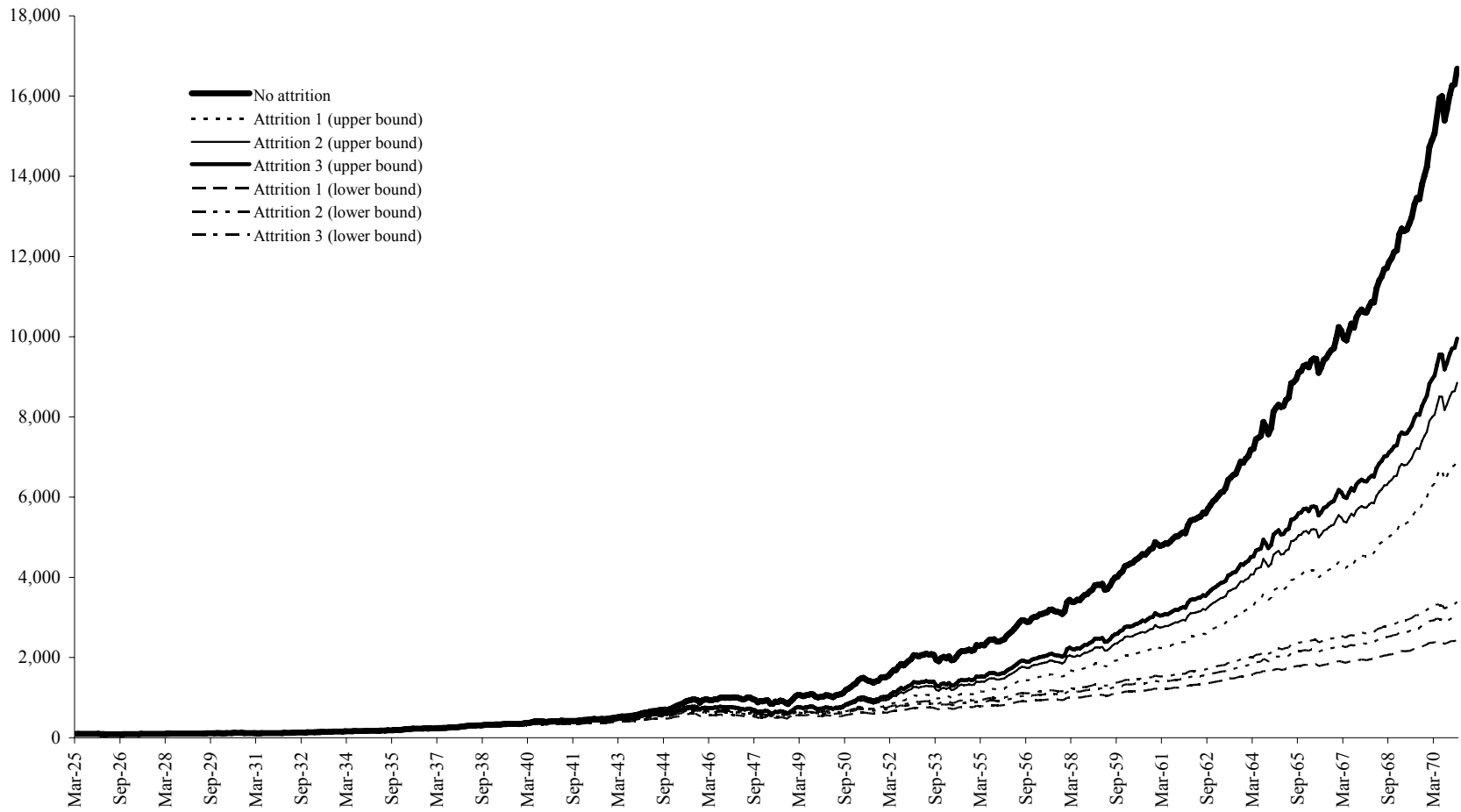|	WMC	WPC	UN		WMC	WPC	UN		WMC	WPC	UN
Mar-25	100.0	100.0	100.0	May-29	86.0	71.4	69.1	Jul-33	92.1	77.7	79.9
Apr-25	98.5	97.9	95.8	Jun-29	86.2	71.5	69.0	Aug-33	92.7	78.4	80.1
May-25	97.3	96.3	92.2	Jul-29	86.3	71.3	69.5	Sep-33	93.4	79.1	80.2
Jun-25	99.5	97.0	94.4	Aug-29	86.7	71.6	69.7	Oct-33	93.0	79.4	82.3
Jul-25	99.2	96.5	91.4	Sep-29	87.5	71.5	70.0	Nov-33	92.8	79.3	82.6
Aug-25	99.2	95.0	91.0	Oct-29	88.6	72.0	70.2	Dec-33	92.9	79.2	82.0
Sep-25	96.3	91.8	85.1	Nov-29	90.0	74.5	71.9	Jan-34	93.3	79.8	83.1
Oct-25	96.5	91.8	86.2	Dec-29	89.8	75.0	72.5	Feb-34	93.9	80.1	84.1
Nov-25	95.1	90.0	83.1	Jan-30	88.5	73.4	72.1	Mar-34	93.9	80.0	83.3
Dec-25	93.6	87.9	81.0	Feb-30	88.1	73.0	71.9	Apr-34	93.7	79.6	82.9
Jan-26	92.2	86.0	79.6	Mar-30	88.6	73.5	73.1	May-34	94.3	79.8	83.2
Feb-26	87.7	81.6	75.3	Apr-30	90.4	75.3	74.9	Jun-34	95.3	80.5	83.7
Mar-26	85.4	78.9	70.6	May-30	91.3	77.2	76.4	Jul-34	95.6	80.5	83.7
Apr-26	84.7	77.4	70.3	Jun-30	93.4	79.0	78.1	Aug-34	95.6	80.6	83.6
May-26	83.5	75.3	68.9	Jul-30	92.2	78.0	77.5	Sep-34	95.1	79.8	82.8
Jun-26	83.1	74.3	68.5	Aug-30	93.0	78.8	77.7	Oct-34	95.1	79.2	83.9
Jul-26	82.5	74.1	68.6	Sep-30	91.2	77.8	77.1	Nov-34	95.5	79.4	83.7
Aug-26	82.5	74.5	68.9	Oct-30	89.3	75.9	76.0	Dec-34	95.6	79.7	84.0
Sep-26	82.1	73.8	69.6	Nov-30	86.3	73.5	74.6	Jan-35	96.0	80.3	84.6
Oct-26	83.4	75.1	70.1	Dec-30	85.5	72.0	73.8	Feb-35	95.8	79.9	84.7
Nov-26	86.2	76.3	70.8	Jan-31	84.3	70.9	73.0	Mar-35	96.0	80.0	84.5
Dec-26	86.1	76.6	73.1	Feb-31	83.7	71.4	73.1	Apr-35	96.9	81.0	85.1
Jan-27	85.3	76.0	72.3	Mar-31	82.4	69.9	72.3	May-35	97.4	80.9	85.1
Feb-27	85.7	76.5	71.9	Apr-31	82.3	69.5	72.0	Jun-35	96.3	79.6	84.2
Mar-27	85.8	75.9	70.9	May-31	82.6	69.2	72.0	Jul-35	98.1	80.3	84.5
Apr-27	86.1	75.3	70.3	Jun-31	82.6	69.5	72.1	Aug-35	98.3	80.0	84.4
May-27	86.1	74.3	69.4	Jul-31	81.7	69.0	71.5	Sep-35	99.4	80.0	84.7
Jun-27	86.6	74.8	70.1	Aug-31	81.3	68.9	71.5	Oct-35	101.0	81.2	85.2
Jul-27	87.1	74.9	69.7	Sep-31	81.2	68.6	71.1	Nov-35	101.8	82.2	86.7
Aug-27	86.3	76.1	71.5	Oct-31	81.4	68.1	70.7	Dec-35	102.6	82.9	86.4
Sep-27	87.0	76.7	72.2	Nov-31	81.3	67.8	70.6	Jan-36	105.6	84.4	89.4
Oct-27	87.5	77.0	71.9	Dec-31	81.3	67.7	70.2	Feb-36	107.8	85.5	90.3
Nov-27	88.1	77.4	72.3	Jan-32	82.1	68.8	70.9	Mar-36	110.3	86.4	92.1
Dec-27	88.0	77.2	73.1	Feb-32	82.8	69.0	71.8	Apr-36	111.6	87.6	92.7
Jan-28	86.9	76.5	72.8	Mar-32	83.4	69.5	72.2	May-36	114.1	90.4	92.4
Feb-28	86.7	75.3	72.0	Apr-32	84.0	70.0	72.4	Jun-36	113.7	89.9	91.5
Mar-28	87.1	76.0	72.5	May-32	84.3	70.1	72.7	Jul-36	112.5	88.5	89.6
Apr-28	87.8	75.9	72.7	Jun-32	84.9	71.0	73.4	Aug-36	113.8	89.2	89.1
May-28	88.1	76.0	72.6	Jul-32	84.9	70.9	73.5	Sep-36	113.5	88.7	89.0
Jun-28	88.8	77.0	72.7	Aug-32	85.3	71.3	73.9	Oct-36	113.2	87.3	89.1
Jul-28	88.0	75.6	71.7	Sep-32	85.3	71.2	73.8	Nov-36	112.0	86.4	86.6
Aug-28	87.9	74.6	71.0	Oct-32	85.3	71.4	73.8	Dec-36	114.0	87.9	90.3
Sep-28	88.1	74.5	71.3	Nov-32	86.6	73.4	74.1	Jan-37	113.5	87.4	89.5
Oct-28	88.4	75.6	72.5	Dec-32	86.6	73.2	74.0	Feb-37	112.9	86.8	88.7
Nov-28	88.3	74.8	71.9	Jan-33	86.0	72.2	74.7	Mar-37	112.8	86.3	87.2
Dec-28	88.1	74.3	71.8	Feb-33	86.6	72.7	75.3	Apr-37	112.0	85.2	87.0
Jan-29	87.0	73.6	71.6	Mar-33	88.1	74.5	76.6	May-37	113.8	86.4	88.2
Feb-29	86.9	73.3	71.2	Apr-33	89.7	75.7	77.4	Jun-37	115.3	87.2	89.3
Mar-29	86.5	72.9	70.4	May-33	90.5	76.5	77.9	Jul-37	117.2	88.4	95.9
Apr-29	85.9	71.7	69.3	Jun-33	91.4	77.0	78.7	Aug-37	117.4	87.9	94.7

	WMC	WPC	UN		WMC	WPC	UN		WMC	WPC	UN
Sep-37	118.8	88.8	96.3	Nov-41	141.6	95.9	111.9	Jan-46	241.0	151.6	170.8
Oct-37	118.4	89.0	97.0	Dec-41	142.4	95.5	112.0	Feb-46	239.8	150.7	170.3
Nov-37	119.7	89.6	97.6	Jan-42	145.4	97.0	112.7	Mar-46	236.1	148.7	165.4
Dec-37	120.5	90.2	98.2	Feb-42	145.1	96.8	112.3	Apr-46	234.6	144.8	158.5
Jan-38	125.0	93.2	103.8	Mar-42	147.4	98.4	113.9	May-46	239.9	148.1	166.1
Feb-38	128.8	96.0	108.4	Apr-42	149.8	100.0	115.4	Jun-46	237.9	145.2	161.1
Mar-38	130.2	96.7	108.1	May-42	149.3	99.3	114.8	Jul-46	244.5	146.6	162.1
Apr-38	130.5	97.0	108.1	Jun-42	147.9	98.1	114.0	Aug-46	246.6	149.9	170.0
May-38	131.7	98.2	108.7	Jul-42	146.6	95.8	112.2	Sep-46	242.5	147.4	168.3
Jun-38	131.8	98.7	109.0	Aug-42	146.4	95.4	111.8	Oct-46	242.7	146.8	172.8
Jul-38	131.7	98.3	108.7	Sep-42	146.8	96.1	113.3	Nov-46	241.3	146.1	176.3
Aug-38	131.6	97.8	107.8	Oct-42	146.2	95.8	113.1	Dec-46	243.2	147.3	178.7
Sep-38	133.4	99.2	108.8	Nov-42	148.0	96.5	113.3	Jan-47	241.1	145.9	177.8
Oct-38	134.0	99.3	109.1	Dec-42	149.9	97.0	113.5	Feb-47	239.3	144.9	177.0
Nov-38	135.1	99.3	108.5	Jan-43	151.9	98.9	114.2	Mar-47	233.1	141.0	173.3
Dec-38	135.2	99.1	108.4	Feb-43	153.5	99.7	114.8	Apr-47	226.8	136.9	169.6
Jan-39	135.8	98.2	108.5	Mar-43	156.5	101.6	116.7	May-47	227.7	135.3	166.6
Feb-39	137.5	99.0	108.9	Apr-43	157.7	102.5	117.4	Jun-47	234.7	138.3	169.0
Mar-39	136.2	96.9	108.6	May-43	157.5	101.5	117.1	Jul-47	232.8	137.6	172.8
Apr-39	136.0	96.6	108.3	Jun-43	157.3	100.9	116.2	Aug-47	223.0	130.3	163.8
May-39	135.7	95.4	107.6	Jul-43	158.2	100.9	115.9	Sep-47	216.6	125.4	158.5
Jun-39	136.4	96.0	108.5	Aug-43	159.6	102.2	116.3	Oct-47	201.6	115.8	148.0
Jul-39	137.0	95.5	109.1	Sep-43	161.0	102.8	117.2	Nov-47	206.7	118.3	154.7
Aug-39	135.7	93.7	108.7	Oct-43	164.0	106.3	119.1	Dec-47	205.0	116.9	153.5
Sep-39	135.3	97.7	112.0	Nov-43	167.4	108.8	120.6	Jan-48	208.2	118.9	157.1
Oct-39	134.8	97.3	111.7	Dec-43	173.9	112.3	122.4	Feb-48	207.0	118.2	155.5
Nov-39	133.3	95.3	110.9	Jan-44	176.8	114.0	123.8	Mar-48	188.7	106.6	143.8
Dec-39	133.4	94.9	110.6	Feb-44	176.5	115.0	124.9	Apr-48	185.6	103.7	138.6
Jan-40	137.2	97.3	111.5	Mar-44	182.5	119.9	128.0	May-48	196.8	110.9	147.9
Feb-40	139.4	98.4	112.2	Apr-44	184.2	121.4	130.0	Jun-48	192.1	110.0	150.4
Mar-40	139.7	97.9	112.4	May-44	184.9	121.8	130.6	Jul-48	199.6	113.5	154.1
Apr-40	143.7	101.1	113.8	Jun-44	184.8	121.9	130.5	Aug-48	195.0	110.1	150.5
May-40	148.6	104.3	115.5	Jul-44	189.6	124.5	132.4	Sep-48	185.5	102.7	143.9
Jun-40	152.2	106.6	116.6	Aug-44	190.2	124.5	133.7	Oct-48	177.0	95.9	138.3
Jul-40	151.1	105.3	116.3	Sep-44	191.0	125.6	135.7	Nov-48	189.2	104.8	150.7
Aug-40	147.9	102.3	114.5	Oct-44	189.0	124.6	134.7	Dec-48	199.3	111.4	157.9
Sep-40	146.1	100.6	113.5	Nov-44	192.0	126.3	134.4	Jan-49	214.0	119.6	167.3
Oct-40	142.8	98.4	112.1	Dec-44	197.5	129.5	136.7	Feb-49	218.3	123.3	183.1
Nov-40	143.7	98.4	112.0	Jan-45	206.8	135.5	143.1	Mar-49	214.9	120.3	181.3
Dec-40	145.4	99.7	112.5	Feb-45	213.7	138.2	147.9	Apr-49	209.2	116.5	179.1
Jan-41	147.0	100.6	112.9	Mar-45	219.4	141.8	152.7	May-49	210.8	116.1	179.1
Feb-41	144.3	98.0	111.1	Apr-45	222.4	142.7	156.8	Jun-49	212.6	116.6	179.3
Mar-41	144.2	98.2	111.6	May-45	233.8	150.4	161.7	Jul-49	214.1	119.0	183.3
Apr-41	147.5	101.1	113.3	Jun-45	239.6	153.3	163.8	Aug-49	211.8	117.0	183.2
May-41	145.8	99.6	112.7	Jul-45	242.5	154.4	163.3	Sep-49	198.6	106.3	173.5
Jun-41	144.7	98.4	111.8	Aug-45	245.6	157.0	172.1	Oct-49	194.1	101.8	170.2
Jul-41	143.0	97.1	110.7	Sep-45	244.8	154.6	182.9	Nov-49	194.9	101.9	170.2
Aug-41	142.4	96.6	110.7	Oct-45	240.7	153.6	180.5	Dec-49	194.5	100.4	169.6
Sep-41	141.1	95.6	111.2	Nov-45	224.6	143.4	166.4	Jan-50	200.6	102.8	171.7
Oct-41	140.8	95.2	112.1	Dec-45	237.1	149.5	173.1	Feb-50	197.3	99.6	169.3

	WMC	WPC	UN		WMC	WPC	UN		WMC	WPC	UN
Mar-50	193.0	95.6	165.3	May-54	286.6	146.5	265.7	Jul-58	365.3	177.2	317.8
Apr-50	186.8	88.9	159.5	Jun-54	298.6	154.1	271.3	Aug-58	369.2	178.2	317.7
May-50	192.8	94.0	163.7	Jul-54	303.2	156.9	275.8	Sep-58	368.9	178.1	316.1
Jun-50	194.3	95.1	163.9	Aug-54	301.5	155.7	272.1	Oct-58	373.4	180.2	314.7
Jul-50	195.7	97.2	168.9	Sep-54	301.2	155.3	275.7	Nov-58	375.5	181.0	320.1
Aug-50	199.8	99.3	170.0	Oct-54	303.1	155.8	282.7	Dec-58	384.7	186.1	329.3
Sep-50	211.1	107.4	174.7	Nov-54	297.0	150.8	278.1	Jan-59	384.0	185.7	329.2
Oct-50	216.0	111.7	182.7	Dec-54	298.3	149.3	278.0	Feb-59	381.5	183.8	330.3
Nov-50	220.7	115.9	189.2	Jan-55	313.0	158.4	280.0	Mar-59	382.5	183.7	337.5
Dec-50	230.8	122.2	196.1	Feb-55	308.6	156.2	278.5	Apr-59	365.4	173.9	329.7
Jan-51	234.3	123.6	195.4	Mar-55	309.9	157.9	283.8	May-59	364.4	172.7	326.9
Feb-51	248.5	133.5	205.8	Apr-55	306.2	155.3	282.1	Jun-59	371.8	176.7	327.7
Mar-51	253.4	138.2	219.7	May-55	314.5	159.7	285.2	Jul-59	381.7	181.7	328.6
Apr-51	255.1	139.1	222.4	Jun-55	320.4	162.1	292.6	Aug-59	386.7	184.4	340.3
May-51	246.9	132.1	215.0	Jul-55	319.1	160.6	297.2	Sep-59	386.5	184.9	343.9
Jun-51	239.7	125.8	211.0	Aug-55	318.7	159.5	296.9	Oct-59	393.1	188.2	350.1
Jul-51	237.1	122.5	206.9	Sep-55	309.7	152.2	292.6	Nov-59	395.2	188.8	356.6
Aug-51	229.5	118.0	202.5	Oct-55	307.3	151.1	287.1	Dec-59	406.0	194.6	363.0
Sep-51	234.0	121.4	204.0	Nov-55	310.0	151.6	288.9	Jan-60	406.3	194.1	365.2
Oct-51	236.4	123.2	207.4	Dec-55	310.7	152.2	288.3	Feb-60	407.5	195.1	365.1
Nov-51	247.5	131.5	215.0	Jan-56	319.6	157.2	288.8	Mar-60	407.1	194.8	364.2
Dec-51	247.8	131.0	214.1	Feb-56	324.9	160.9	292.5	Apr-60	410.5	196.8	368.1
Jan-52	247.4	130.4	214.4	Mar-56	329.3	164.4	295.2	May-60	411.6	196.8	371.0
Feb-52	250.2	132.6	216.6	Apr-56	334.4	167.4	301.9	Jun-60	414.0	197.8	373.2
Mar-52	261.7	139.9	225.1	May-56	342.1	171.6	306.5	Jul-60	417.8	199.9	370.6
Apr-52	272.2	146.7	233.2	Jun-56	350.6	176.4	314.4	Aug-60	414.0	198.6	366.6
May-52	269.7	144.4	232.2	Jul-56	355.6	178.5	315.7	Sep-60	418.5	200.8	370.3
Jun-52	282.7	151.8	242.5	Aug-56	352.3	176.1	312.4	Oct-60	422.1	202.6	370.3
Jul-52	291.8	157.1	251.4	Sep-56	346.1	173.3	309.6	Nov-60	421.9	201.9	371.8
Aug-52	283.9	152.1	248.1	Oct-56	345.0	172.3	307.2	Dec-60	433.0	207.7	380.1
Sep-52	292.1	157.9	256.7	Nov-56	352.9	176.9	310.4	Jan-61	425.3	204.0	374.7
Oct-52	299.5	163.5	263.4	Dec-56	354.3	177.3	311.5	Feb-61	419.7	201.1	384.2
Nov-52	306.0	165.8	276.6	Jan-57	354.2	177.0	311.2	Mar-61	419.4	201.3	388.0
Dec-52	320.0	173.9	297.1	Feb-57	357.3	179.1	313.1	Apr-61	420.5	201.6	385.4
Jan-53	317.5	171.8	288.9	Mar-57	356.6	178.6	314.7	May-61	417.7	200.5	388.5
Feb-53	311.4	166.5	292.1	Apr-57	357.2	178.7	311.5	Jun-61	419.9	201.3	387.4
Mar-53	316.3	169.0	294.7	May-57	356.8	178.4	310.3	Jul-61	422.7	206.0	394.9
Apr-53	315.2	168.0	291.0	Jun-57	361.3	180.8	311.8	Aug-61	425.7	207.2	397.0
May-53	318.2	169.7	294.1	Jul-57	360.0	180.1	311.6	Sep-61	423.1	205.6	403.8
Jun-53	313.7	166.9	288.8	Aug-57	352.9	175.4	306.9	Oct-61	426.1	207.1	404.8
Jul-53	313.5	166.3	287.4	Sep-57	348.7	173.0	307.0	Nov-61	427.3	208.0	417.2
Aug-53	309.6	164.1	283.7	Oct-57	345.1	170.1	302.0	Dec-61	423.2	205.6	410.8
Sep-53	287.9	150.3	271.2	Nov-57	338.5	166.8	297.2	Jan-62	437.2	212.6	424.6
Oct-53	281.7	145.7	270.3	Dec-57	342.5	169.1	299.7	Feb-62	444.6	215.4	432.2
Nov-53	292.8	151.6	277.6	Jan-58	365.7	181.7	312.6	Mar-62	443.8	215.1	433.0
Dec-53	295.8	153.6	281.2	Feb-58	369.6	182.7	316.5	Apr-62	442.9	213.4	431.4
Jan-54	287.4	148.2	274.1	Mar-58	361.5	178.2	317.6	May-62	444.0	213.2	441.6
Feb-54	294.1	152.4	274.3	Apr-58	360.6	177.3	317.6	Jun-62	443.0	212.5	441.8
Mar-54	277.6	142.6	265.7	May-58	363.8	178.3	320.2	Jul-62	448.5	216.0	449.2
Apr-54	279.3	143.3	264.3	Jun-58	359.4	174.3	317.3	Aug-62	445.3	214.1	444.1

	WMC	WPC	UN		WMC	WPC	UN		WMC	WPC	UN
Sep-62	451.6	215.9	454.0	Jul-65	563.9	251.1	550.3	May-68	552.3	227.2	619.4
Oct-62	456.6	218.1	461.6	Aug-65	564.5	251.0	553.3	Jun-68	552.9	229.0	634.8
Nov-62	461.5	220.4	463.4	Sep-65	570.9	254.0	563.5	Jul-68	558.1	230.1	648.0
Dec-62	462.6	221.1	463.5	Oct-65	568.4	252.5	562.2	Aug-68	555.7	230.2	647.4
Jan-63	467.0	222.4	472.9	Nov-65	572.4	253.9	574.8	Sep-68	559.1	231.9	650.5
Feb-63	470.3	224.5	476.4	Dec-65	569.8	251.2	576.9	Oct-68	560.0	232.5	655.3
Mar-63	469.7	223.6	479.4	Jan-66	561.2	246.8	567.7	Nov-68	563.4	233.7	663.3
Apr-63	473.6	225.6	479.6	Feb-66	567.2	248.6	565.8	Dec-68	561.6	231.7	657.5
May-63	486.6	232.3	486.0	Mar-66	565.7	246.5	568.9	Jan-69	576.5	238.7	670.7
Jun-63	487.4	231.8	488.6	Apr-66	560.0	243.1	552.9	Feb-69	579.1	239.0	682.8
Jul-63	489.5	232.9	487.6	May-66	534.2	229.2	518.6	Mar-69	572.1	233.8	679.2
Aug-63	489.2	232.2	486.2	Jun-66	536.7	230.7	511.9	Apr-69	569.3	231.8	672.4
Sep-63	497.6	234.9	501.9	Jul-66	542.9	232.3	530.6	May-69	572.1	232.3	667.3
Oct-63	506.2	238.2	510.0	Aug-66	540.6	230.6	534.0	Jun-69	574.9	233.5	668.5
Nov-63	501.6	235.2	508.0	Sep-66	542.7	232.2	546.7	Jul-69	585.6	238.7	683.7
Dec-63	506.0	237.4	508.3	Oct-66	542.6	229.3	539.3	Aug-69	588.1	239.7	694.2
Jan-64	507.5	237.5	511.7	Nov-66	540.5	226.8	552.8	Sep-69	582.6	237.2	693.1
Feb-64	516.0	240.4	528.4	Dec-66	549.7	231.6	551.6	Oct-69	594.2	242.4	710.6
Mar-64	515.1	239.2	539.2	Jan-67	560.9	236.6	569.8	Nov-69	599.7	243.2	716.8
Apr-64	528.6	242.5	547.6	Feb-67	551.0	231.0	564.0	Dec-69	604.7	245.1	719.5
May-64	528.1	241.8	549.9	Mar-67	535.8	221.5	552.7	Jan-70	622.1	252.6	763.4
Jun-64	527.8	242.0	547.7	Apr-67	529.0	218.1	563.8	Feb-70	625.5	252.9	767.9
Jul-64	549.0	251.7	566.1	May-67	536.6	222.5	573.3	Mar-70	628.0	253.1	766.8
Aug-64	536.8	246.0	553.3	Jun-67	542.2	224.5	585.4	Apr-70	642.4	259.9	787.7
Sep-64	520.1	237.4	539.2	Jul-67	532.2	217.5	575.0	May-70	655.6	264.1	806.7
Oct-64	526.8	241.0	536.5	Aug-67	541.6	224.3	584.7	Jun-70	653.6	263.7	819.0
Nov-64	550.3	252.1	555.3	Sep-67	543.8	225.3	596.1	Jul-70	624.1	248.1	798.4
Dec-64	553.0	252.8	555.4	Oct-67	543.9	225.2	597.9	Aug-70	630.8	250.4	788.6
Jan-65	553.9	253.3	558.9	Nov-67	536.3	220.4	589.4	Sep-70	641.2	256.4	801.4
Feb-65	545.8	248.7	548.4	Dec-67	532.0	218.4	585.1	Oct-70	645.9	258.5	810.6
Mar-65	542.8	247.0	543.9	Jan-68	535.6	219.1	588.5	Nov-70	642.6	255.7	813.0
Apr-65	548.5	250.1	537.3	Feb-68	537.7	219.3	591.7	Dec-70	653.6	259.9	813.1
May-65	547.9	249.0	532.6	Mar-68	533.2	217.5	585.8				
Jun-65	566.8	253.1	554.9	Apr-68	546.5	225.6	611.3				

Notes: WPC = weighted by paid-up capital; WMC = weighted by market capitalization; UN = unweighted.