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*The Liquidity of the London Capital Markets, 1825-1870**

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Abstract

This paper examines the liquidity of the London capital markets in the decades following the liberalisation of UK incorporation law. Using comprehensive stock and bond data, we calculate a measure of market liquidity for the period 1825-70. We find that stock market liquidity trended upwards but bond market liquidity did not increase over the sample period. Stock market liquidity during our sample period was partially influenced by the bond market, rather than fluctuations in economic output. In our analysis of the cross-sectional determinants of individual stock liquidity, we find that firm size and the number of issued shares were important determinants of liquidity. Finally, we find little evidence of an illiquidity premium, which is consistent with the view that investors did not price liquidity in this nascent market.

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*The Liquidity of the London Capital Markets, 1825-1870**

The London securities market experienced substantial growth in the decades following the repeal of the Bubble Act in 1825.¹ The liberalisation of incorporation law, and Parliament's permissiveness in granting corporate status for public goods such as railways, resulted in the growth of the number of business enterprises having their shares and bonds traded on the London and provincial stock exchanges.² There was also an increase in the number of foreign countries and companies raising bond finance on the London market from the 1850s onwards. However, there has been very little research for this pivotal period of capital-market development on the liquidity of the market, the determinants of liquidity amongst the cross-section of stocks, or whether liquidity had an impact on the pricing of stocks and bonds.

The first contribution of this paper is to provide a measure of market liquidity for bonds and stocks for the period 1825-70. Bond market liquidity was relatively high throughout this era, but did not trend upwards over time. In contrast, our results suggest that there was a strong secular increase in stock liquidity from 1830 to 1870. This may have both reflected, and encouraged, greater participation in the stock market as the period progressed. If liquidity is viewed as an important factor which influences the attractiveness of equity as an investment relative to alternatives, it may have affected the growth and deepening of the overall stock market as well as economic growth.³

¹ Harris, *Industrializing*, pp. 218-9.

² Acheson et al., 'Rule Britannia'; Michie, *London Stock Exchange*, pp.37-69; Thomas, *Provincial Stock Exchanges*, pp. 3-71.

³ Levine and Zervos, 'Stock markets'; Moore, 'Financial market liquidity'; Rousseau, 'Share liquidity'.

Our second contribution is that we explore the cross-sectional differences in liquidity between stocks in order to understand the main determinants of stock liquidity in this era. We find that firm size and the number of issued shares were important determinants of liquidity which suggests that larger firms and firms with a greater number of shares were more frequently traded, possibly because they were regarded as lower risk or they tended to have a broader ownership base, making it more likely that at least some shareholders were going to trade at a particular time.

Our final contribution is to explore whether asset liquidity was priced by investors. Share illiquidity at the level of the individual stock may be regarded by investors as one source of investment risk, which can potentially affect the cost of equity capital.⁴ In the historical context, it has been argued that what mattered to investors during this era was the dividend or coupon they received followed by the ready saleability or liquidity of their securities.⁵ However, we find little evidence of an illiquidity premium in stock or bonds, which suggests that investors at the time did not put much emphasis on liquidity in their valuations.

Our paper reveals the levels, trends, and causes of liquidity on the London Stock Exchange, during the era when it was emerging as a major capital market. As having the ability to liquidate ownership is one of the prime advantages of having a stock market listing, this helps us to understand one of the key issues in the development of the most important financial market in the world at that time. Our findings also provide new insights into the extent and importance

⁴ See, for example, Amihud, 'Illiquidity'; Amihud and Mendelson, 'Asset pricing'; Chordia et al., 'Market liquidity'; Liu, 'Liquidity-Augmented'; Pàstor and Stambaugh, 'Liquidity risk'.

⁵ Jefferys, *Business organisation*, pp. 176, 209.

of liquidity on historical markets more generally, and build on a relatively small existing literature in this area.⁶

The rest of this paper is organised as follows. Section one introduces our dataset, provides some context in terms of the development of the London equity and bond markets and discusses how we measure liquidity. Section two examines the cross-sectional determinants of stock liquidity. Section three analyses the determinants of market liquidity over time. Section four examines whether stock and bond liquidity is priced in this historical market. The final section is a brief conclusion.

I

Our main source of equity-market data is the *Course of the Exchange* (COE), which, during our sample period of 1825 to 1870, was regarded as the official price list of the London Stock Exchange. It was compiled by James Wetenhall, a stockbroker, ‘by authority of the Committee of the Stock Exchange’ and was ‘always spoken of as an accurate publication’.⁷ For each month, we collected dividends, number of shares, nominal value and paid-up capital (par value) for each stock. We also collected the last reported share price during the month by manually going through each bi-weekly issue in the particular month. Most of the stocks reported in the COE during our sample period were included in our sample except for shares which were listed for less than 12 months, shares which had no reported capitalisation data (i.e., number of issued shares, nominal or paid-up value) and shares that reported prices for less than 10 per cent of their

⁶ Alquist, ‘How important is liquidity risk’; Moore, ‘Financial market liquidity’; Acheson and Turner, ‘Secondary market’.

⁷ *The Bankers’ Magazine*, 1845, p.359.

listing months. After applying the above criteria, our sample includes data on 1,015 stocks for 681 companies.⁸

Among these 1,015 stocks, 762 disappeared from our sample before the end of 1870.⁹ Most stocks did not delist because of performance reasons - after searching the *Times Digital Archive* and the *London Gazette*, we found that only 112 stocks delisted due to their performance, whereas 549 delisted because of mergers, name changes, or migrating to provincial stock exchanges. There were only 111 stocks where we could not ascertain the reason for delisting.

We obtained data on bonds traded on the London Stock Exchange from Global Financial Data, who report that they use *The Times* and *Investors' Monthly Manual* as their original sources. The issuer of each bond, its coupon, and its price each month were collected. There are some months where data is missing. If the data is missing for an entire year we assume that the bond was not listed during that year. For other missing months we assume that the bond was listed, but its price did not change.

<<INSERT TABLE 1>>

Table 1 shows the extent of our collected data for both stocks and bonds, reporting the number of securities at the end of each year and the sector/issuer composition of the market. Three things are worthy of note for the growth of the equity market over the 1825-70 period. First, the most significant increases in the number of equities correspond to the expansion of joint-stock banking and railway boom of the mid-1830s and the Railway Mania of the mid-1840s. Second, banks, insurance and transportation (canals and railways) were important components of the equity market in this era. Third, the infrastructure sector played a diminishing role in the

⁸ See Acheson et al., 'Rule Britannia' for more information on the sample.

⁹ See Ye and Turner, 'The Cross Section' for more information.

equity market over the period. In terms of the growth of the bond market, there was an increase in the issuance of bonds by both foreign and British corporations, leading to an almost tenfold rise in the number of bonds listed, from only 47 in 1825 to 509 in 1870.

Unfortunately it is difficult to obtain an annual measure of the market value of fixed-interest securities because we do not know the size of respective issues. However, using data on nominal values from Michie and Coyle and Turner, we are able to generate point estimates for the size of the fixed-income market relative to the London equity market.¹⁰ In 1853, British government debt was by far the largest type of security, with a nominal value of £853.6m, whilst foreign and colonial government debt had a nominal value of £69.7m, and corporate bonds were still rare. From our sample, the market capitalization of equities at this time was £166.8m. In 1863, the nominal value of British government debt was £901.9m, foreign and colonial government debt was £171.4m, and corporate bonds was £5.7m, whilst the market capitalization of equities in our sample was £255.7m. Therefore, although the equity market was relatively small compared to British government debt, it was larger than the market for foreign government debt or corporate bonds.

For our liquidity measure, we use an approach which was originally proposed by Lesmond et al.¹¹ We take the proportion of months with non-zero returns over a year for a particular asset as our annual measure of liquidity for this asset. Thus the liquidity of asset i in year t is

¹⁰ Michie, London Stock Exchange, p.88; Coyle and Turner,

¹¹ Lesmond et al., 'A new estimate'.

$$Liquidity_{i,t} = 1 - \frac{\text{number of months in which asset } i \text{ had zero return}}{\text{number of months in which asset } i \text{ was listed}} \quad (1)$$

A zero return occurs if there was no change in the asset's price from the previous month, or no price is reported. This will usually be a good indication that no trade has taken place. This is because it is common practice for media outlets, both in the modern era and historically, to report 'stale' prices for companies that have not traded. For example, we can look at a company in our dataset such as the Albion insurance company. The *Course of the Exchange* reported that the share price of Albion was £60 in each of its 77 issues between 3rd May 1825 and 24th January 1826. The share price then changed to £58, and stayed at this price for another 33 issues. It was then reported as £53 for another 43 issues. The price was missing for the next four issues. It was then reported as £55 for another 53 issues. This pattern continued year after year, and it was common across companies. It seems much more likely that the unchanged prices were stale prices and that no new trades had taken place, rather than repeated trades at exactly the same price week after week.¹²

One possible concern may be that a small proportion of trades could occur at exactly the same price as the previous month, giving a zero return. This may mean that we slightly understate the amount of trading which is occurring on average, but this is likely to be relatively minor. For example, we would expect UK government 3 per cent Consols to trade every month, but using our measure they traded 95.2 per cent of months. Similarly, we would expect the primary securities of the large railways to trade every month, but using our measure, the London & North Western traded 94.8 per cent, the Great Western traded 96.4 per cent, and the Midland

¹² Notably, for Consols, the most actively traded asset in the market, there is only one occasion when our measure suggests there were consecutive no-trades appearing, i.e., end-of-month prices were the same in February, March and April 1840. This suggests that unchanged prices of other assets suggests an absence of trading.

96.5 per cent. Furthermore, there is no reason why this should affect particular companies or time periods more than others, which means that our estimates should provide a good measure of cross-sectional and time-series differences in liquidity.

Lesmond et al. show why the incidence of zero returns should theoretically be a good measure of liquidity.¹³ The transaction costs of a security constitutes a threshold that must be exceeded before a security's return will reflect new information. As it is more difficult to overcome higher transaction costs, securities with high transaction costs are more likely to have periods with no trading or periods with no-information-revelation trading, resulting in a greater incidence of zero returns for these securities. Several studies on modern stock markets have demonstrated that the incidence of zero returns is an effective liquidity measure.¹⁴ Numerous other studies have also used the incidence of zero returns in their analysis to measure stock and bond liquidity.¹⁵

In order to ensure that the zero returns measure serves as a good proxy for liquidity in our period, we also collected some bid-ask spread data from *The Times*.¹⁶ The extent of coverage is limited to just a few railways before the 1850s, so we focus on the latter half of our sample. We collect bid and ask prices for a day in early February in 1855, 1860, 1865 and 1870 for those assets which *The Times* reported spreads for, giving 883 observations in total. We then calculated the bid-ask spread as the difference between the bid and ask prices, expressed as a percentage of the midpoint of the bid and ask prices. There is a -0.35 correlation between our

¹³ Lesmond et al., 'A new estimate'.

¹⁴ See Bekaert et al., 'Liquidity', Goyenko et al., 'Do liquidity measures', and Lesmond et al., 'The illusory nature'.

¹⁵ Bekaert et al., 'Liquidity'; Moore, 'Financial market liquidity'; Chen et al., 'Corporate yield spreads'.

¹⁶ Similar to the modern era, jobbers in the market during this period demanded a wide "turn" in stocks where transactions were less frequent – see Morgan and Thomas, 'The stock exchange', pp.117, 146.

zero returns measure and bid-ask spreads, confirming that higher liquidity from our measure is associated with lower bid-ask spreads. From the univariate regression the t-statistic is -8.70, demonstrating the highly significant nature of the relationship, suggesting that our measure is a reliable measure of liquidity.

The measure also makes sense intuitively for the era examined in this paper. It focuses on how frequently a security was traded, which reveals how easily an investor could sell it when necessary. This transferability of ownership, rather than other dimensions of liquidity (e.g., transaction costs or price impact), was possibly of first-order importance as assets during this era tended to be owned by individual investors.¹⁷

Our liquidity measure based on the incidence of zero returns in the year was calculated using security prices sampled at a monthly frequency. However, in order to evaluate whether this monthly measure tracks an alternative approach that uses higher frequency data, we have also collected weekly stock prices from the COE for a small group of representative blue-chip stocks. We select the blue-chip stocks in year t based on the 30 largest companies by market capitalisation at the end of year $t-1$.

Between 1825 and 1870, the average liquidity for these blue-chip stocks was 0.715 at a monthly frequency, and 0.469 at a weekly frequency. We find that, for the sample of blue-chip stocks, the cross-sectional correlation between our liquidity measure calculated with monthly

¹⁷ Campbell and Turner, 'Dispelling the myth' suggest that investors in a large established railway, the Great Western in 1843 were mainly gentlemen, merchants, businessmen, and women. Those involved in finance, either as brokers or bankers, made up only a small proportion. Those investing in the smaller, riskier ventures promoted during the Railway Mania tended to be similar, although merchants, businessmen and the middle classes were somewhat more important.

frequency prices and that calculated with weekly frequency prices is 0.80. Moreover, the average liquidity for the blue chip stocks calculated using monthly frequency prices has a 0.97 correlation with that calculated using the weekly prices. Therefore, our monthly liquidity measure captures the cross-sectional and time-series variation in the higher frequency prices.

Figure 1 shows the average liquidity of stocks and bonds on the London Stock Exchange for each year of the sample period. From Figure 1, we can see that stock liquidity fell from 1825 until the 1830s, but then trended upwards over the remainder of the sample period. The liquidity of the bond market was, on average, higher than that of the stock market over 1825 to 1870. However, unlike the stock market, the bond market did not see an increase in liquidity over the sample period. As a result, there was a convergence in liquidity in the second half of our sample period.

<<INSERT FIGURE 1 >>

Table 2 shows the annual average stock liquidity on the London equity market broken down by sector. The first thing to note is that railways were by far the most liquid sector during this period, with average liquidity being 0.655 relative to the average liquidity of 0.467 for equities overall. The railways tended to be much larger than other companies, and were widely held by shareholders.¹⁸ The next most liquid sector in this era was banking, which may reflect their relative size and the relatively wide dispersion of their shares.¹⁹

<<INSERT TABLE 2>>

In Table 2 we also report the annual average liquidity for bonds in their various categories. We see that UK government bonds were extremely liquid throughout the period.

¹⁸ Cheffins, *Corporate ownership*, pp.157-9.

¹⁹ See Acheson et al., ‘Does limited liability matter’.

There is an apparent dip in liquidity in the mid-1840s, although this is likely due to incomplete data on some annuities during this year, where we have assumed that they did not trade. There is another dip at the end of the period, again driven by some annuities whose price remained unchanged for numerous months. Foreign government bonds tended to be less liquid than UK government bonds, but more liquid than corporate bonds.

In Table 3 we report the number of securities and average liquidity for securities that enter and exit the market each year between 1825 and 1870. Consistent with expectations the newly-listed stocks were more liquid than others. They had an average liquidity of 0.511, which is statistically greater than liquidity for ‘exit’ stocks or ‘other’ stocks. The liquidity for ‘exit’ stocks is higher than one might expect, but this can simply be explained by the fact that just under 15 per cent of these stocks exited for performance reasons. Newly-listed bonds had an average liquidity of 0.592 relative to 0.464 for ‘exit’ bonds, but were lower than the liquidity of ‘other’ bonds which were at 0.692.

<<INSERT TABLE 3>>

II

Previous studies of the cross-sectional determinants of stock liquidity have argued that the costs charged by market makers are determined by the risks of holding inventory, cost of matching the buyers and sellers, risk of informed trading and competition, and that stock characteristics such as price, number of dealers, number of shareholders, volume, volatility all influence liquidity.²⁰ As stocks of larger companies usually have more dealers and shareholders, we would

²⁰ Demsetz, ‘The costs of transacting’; Benston and Hagerman, ‘Determinants’; Branch and Freed, ‘Bid-asked spreads’; Stoll, ‘The pricing of security’.

expect market capitalisation to be positively associated with liquidity. We also use the number of issued shares as a proxy for the number of shareholders. Moreover, we examine whether the past return of the stock affects liquidity, with the reason being that past performance of the stock could change investors' expectations about the stock and hence their trading activity. As dividend income was a very important source of return for stock investors in this era, one might expect that stock investors cared less about stock transferability when a company was paying a high dividend.²¹

Apart from the above variables, some nineteenth-century shares also had a few features that were unusual and their influence on stock liquidity is an important consideration in evaluating the costs of these features. First, not all shares had limited liability attached to them – some shares had unlimited liability, whilst others had uncalled capital attached to them i.e., unpaid capital which could be called up at any time by company directors. Such shares may have been more illiquid than pure limited liability shares because of the need for prior approbation before they were sold.²²

Second, high share denominations were a common feature in this and other early stock markets.²³ High share denominations are believed to be detrimental to stock liquidity,²⁴ because they may impose participation constraints on potential investors.²⁵ However, despite participation constraints, share denomination may be positively correlated with liquidity from the trading cost perspective because the proportional brokerage commissions associated with

²¹ Acheson et al., 'Rule Britannia'; Turner et al., 'Why do firms pay dividends'.

²² Acheson et al., 'The character and denomination', p. 873; Taylor, *Creating capitalism*, p. 194.

²³ Acheson et al., 'The character and denomination'; Jefferys, 'The denomination and character'.

²⁴ Copeland, 'Liquidity'; Han, 'Reverse'; Rousseau, 'Share liquidity'.

²⁵ Rousseau, 'Share liquidity'.

trading high denomination shares will be significantly less than trading low denomination shares. For example, in 1870, the brokerage cost was five per cent for shares with £1 nominal value but 0.5 per cent for shares with nominal value greater than or equal to £50.²⁶ A table of commissions charged by London brokers which is reported in *Tuck's Railway Shareholder Manual* in 1847 suggests that these rates of commissions also prevailed at a much earlier period.

As a result, investors would buy/sell the low-denomination shares only if they expected that new information could move the share prices significantly. Alternatively, high denominations may have signalled firm quality and good corporate governance, making such shares more desirable and marketable.²⁷ Among contemporary investors there was also a perception that high nominal value may have signalled good corporate governance.²⁸

In Table 4, we report the summary statistics for our explanatory variables. We can see that stocks in 1825 had very different features than stocks in 1865. For example, a typical share in 1825 had a much higher nominal value and smaller number of issued shares compared to a typical share in 1865. The average market capitalisation of the stocks in 1865 was more than three times of that in 1825. In addition, the proportion of shares that were not fully paid up also declined over time.

<<INSERT TABLE 4>>

From Table 5, which displays the correlation among stock liquidity and selected explanatory variables, we can see that share liquidity is positively correlated with *Size*, *No.*

²⁶ Acheson et al., 'The character and denomination', pp. 870-1.

²⁷ Chung et al., 'Corporate governance' show that better firm corporate governance improves stock liquidity.

²⁸ Jefferys, 'The denomination and character', p.50. Acheson et al., 'The character and denomination', p.871 note that "the general belief at the time was that high share denominations meant that investors could only have an interest in a small number of companies and were therefore more likely to play an active governance role."

shares, Uncalled capital, and Stock return. It is negatively correlated with *Share denomination, Extended liability, Dividend* and *Div/Par*.

<<INSERT TABLE 5>>

In order to examine the marginal effects of each share characteristic on share liquidity, we run a multivariate regression analysis with individual stock liquidity for year t as the dependent variable and various share characteristics in year $t-1$ as the independent variables. We also include the stock liquidity in year $t-1$ in the regression to control for the potential autocorrelation in liquidity. For the sake of robustness and to gain further insights, we also run regressions for several subsamples, i.e., railway shares, non-railway shares, and fully-paid stocks. In Table 6, we report the regression results with standard errors clustered on both firm and year.

29

<<INSERT TABLE 6>>

From the regression results in Table 6, we see that more liquid stocks in year $t-1$ also tend to be more liquid in year t . The coefficient of 0.310 on lagged liquidity in column (10) suggests that companies with higher liquidity in the previous year will also have higher liquidity in the subsequent year, even after controlling for other factors. *Size* is an important determining factor for liquidity, with the coefficients in each specification being positive and highly significant. For example, in column (10), the size coefficient suggests that if the market capitalisation doubled, there would be about half a month (0.58 months) of extra trading on average per year. The influence of size on liquidity can also be seen from Figure 2 in which the value-weighted measure consistently suggests a higher level of liquidity in the market than the equally-weighted measure. In Table 7, which investigates the determinants of liquidity in subsamples, we can see

²⁹ Petersen, ‘Estimating standard errors’.

that the influence of *Size* on stock liquidity is weaker in railway shares relative to non-railway shares.

<<INSERT FIGURE 2>>

The regression results in Table 6 also suggest that the number of shares positively and significantly influenced liquidity. This may have been because a greater number of shares was associated with a wider base of ownership, making it more likely that at least some shareholders were going to trade at a particular time. The coefficient on *No. shares* in column (10) suggests that a doubling in the number of shares would lead to an increase of just less than half a month (0.38) of extra trading on average per year.

The results in Table 6 suggest that, in the multivariate regression analysis controlling for other variables, there is not much of a relationship between share denomination and subsequent liquidity, which is consistent with the views of Jefferys that share denomination did not affect liquidity.³⁰ In the railway subsample, the positive and statistically significant coefficients on the *Share denomination* variable imply that the denomination and liquidity of railway stocks was positively correlated. This result is consistent with the trading costs hypothesis i.e., railway shares with higher denomination were more liquid because they were less costly to trade. Alternatively, high denominations may have signalled firm quality and good corporate governance, making such shares more desirable and marketable.³¹ Notably, among contemporary investors there was a perception that high nominal value may have signalled good corporate governance.³²

³⁰ Acheson et al., 'The character and denomination', p. 880; Jefferys, 'The denomination and character'.

³¹ Chung et al., 'Corporate governance' show that better firm corporate governance improves stock liquidity.

³² Acheson et al. 'The character and denomination'; Jefferys 'The denomination and character'.

The coefficient on the *Stock return* variable is significantly positive in the univariate regression analysis in column 8 of Table 6. It could be argued that this increased trading may have been driven by some investors responding to higher prices, with some buying in the hope of further increases, whilst others sell or short-sell. However, when other explanatory variables are controlled for, it is not statistically significant, suggesting that a stock's previous performance does not correlate with its present liquidity. This implies that markets did not become thinner for poor performers and vice versa.

We also include a dummy variable which equals 1 if a company had an IPO during that year. It is significantly positive when considered alone, suggesting that these new companies had higher liquidity. However, when other characteristics are controlled for, it does not remain significant.

The influence of *Uncalled capital* upon stock liquidity is mixed. The last two columns in Table 6 show that the coefficient on the *Uncalled capital* variable is significantly positive in one of two specifications. Table 7 indicates that *Uncalled capital* did not have much influence on stock liquidity amongst non-railway shares, but it may improve liquidity in railway shares as the coefficient on *Uncalled capital* is positive in one of two specifications for the subsample of railway shares. Uncalled capital was common in railways when they first issued new equities on the stock market; it allowed investors to view their investment as an instalment plan because the company called up capital on a regular basis during the construction of the railway.³³ This made the shares popular with investors, particularly during the Railway Mania, which may explain the positive relationship between uncalled capital and subsequent liquidity.³⁴

³³ Acheson et al. 'The character and denomination', p. 873.

³⁴ Campbell, 'Deriving the Railway Mania'.

The coefficients on the Extended liability variable in Table 6 suggest that limited liability shares were more liquid than those with extended liability. For example, the presence of extended liability in the previous year reduced liquidity in the current year by 0.095 which represents 1.14 months less of trading. However, the coefficients in a sample of fully-paid shares in Table 7 fall outside the usual bounds of statistical significance. Thus, extended liability only seems to matter for liquidity when shares are partially paid. Extended liability, therefore, is not a determining factor of liquidity for fully-paid stocks.

We also find that, except for the railway sector, the absolute amount of dividends (*Dividend*) and dividend-par ratio (*Div/Par*) do not have explanatory power for share liquidity. The negative coefficient on the two dividend variables in specifications 1 and 2 in Table 7 suggest that high-dividend railway stocks tended to be less liquid than low-dividend railway stocks. There are at least two non-mutually-exclusive reasons for this finding. First, partially-paid railway shares were more liquid than fully-paid railway shares, and these partially-paid shares did not pay dividends because the railway line had not yet been completed. Second, high-dividend-paying railway stocks were bought and held by investors and traded infrequently, with the result that they were less liquid. Investors may have been content with the lower liquidity of these railway stocks because they paid high and stable dividends, unlike most other contemporary companies.³⁵

<< INSERT TABLE 7 >>

III

³⁵ Turner et al. 'Why do firms pay dividends'.

After investigating the cross-sectional determinants of stock liquidity, we turn in this section to investigate the time-series trend of liquidity in both stocks and bonds. In particular, we want to investigate why stock and bond liquidity fluctuated during our sample period by analysing the effect of financial market conditions and the macroeconomic environment upon liquidity. We are also interested in the cross-market dynamics between stocks and bonds.

In Figure 1, we observed that the liquidity of the average stock increased over the period. One of the possibilities for this is that the propensity for investors to trade on the stock market increased during this era. However, another possibility could be that the stock market became more liquid because the characteristics of equities listed on the market changed. As can be seen from Figure 3, the average capitalisation of equities increased steadily over the period. This implies that large companies, which tended to have higher liquidity, became more prevalent, leading to the overall market being more liquid.

<<INSERT FIGURE 3>>

One way to determine whether stock liquidity changed due to changing stock characteristics is to use the regression from the previous section where stock characteristics are regressed on liquidity. We first run the regression in specification 11 in Table 6 over the sample period of 1825-1870. The coefficients from this regression and the value of the explanatory variables are then used to calculate the predicted liquidity, which reflects the expected liquidity given the characteristics of a stock, of each stock for each year over the entire sample period.

In Figure 4, the average actual liquidity and the average predicted liquidity of all stocks in the market are plotted. The results suggest that actual and predicted liquidity trend upwards together closely, which implies that changing stock characteristics explain a lot of the increase in stock liquidity over the sample period.

<< INSERT FIGURE 4 >>

Despite the strong explanatory power of the share characteristics on stock liquidity, Figure 4 shows that actual stock liquidity fluctuates around predicted liquidity. To address why this may have occurred, and to explain fluctuations in stock and bond liquidity throughout the period, we examine whether movements in the financial markets or macroeconomic environment were influential. Several studies of modern markets have documented that stock and bond market returns and their respective volatilities are determinants of stock and bond market liquidity.³⁶ In addition, the relationship between economic growth, inflation, monetary policy and stock and bond market liquidity has been demonstrated for several modern markets.³⁷

The theoretical explanations for the empirically documented relationship between financial market liquidity and these economic and market variables are several-fold. Firstly, increased stock and bond market volatility has a direct impact on the inventory risk of liquidity providers and may therefore have negative effects on overall market liquidity.³⁸ However, in cases where there are common influences that drive the trading activities in both the stock and bond markets, their volatility and liquidity may be positively correlated. In addition, there may exist cross-market influence. For example, an increase in volatility in the stock market could cause a positive change in liquidity in the bond market due to the “flight to safety” phenomenon in which investors shift their investment from what they perceive to be high-risk assets to low-risk assets in a period of financial turmoil. Secondly, based on investor expectation theory, rises

³⁶ Chordia et al., ‘Market liquidity’; Chordia et al., ‘Evidence’; Goyenko and Ukhov, ‘Stock’; Söderberg, ‘Macroeconomic variables’; Næs et al., ‘Stock market’; Vayanos, ‘Flight to quality’.

³⁷ Eisfeldt, ‘Endogenous liquidity’; Fujimoto, ‘Macroeconomic sources’; and Söderberg, ‘Macroeconomic variables’.

³⁸ Ho and Stoll, ‘Dynamics’; Fujimoto, ‘Macroeconomic sources’.

in bond or stock returns may induce investors to reallocate wealth between equities and debt securities and hence affect both stock and bond liquidity.

Thirdly, increases in interest rates have the potential to reduce financial market liquidity due to its negative influence on the level of funding liquidity and due to its positive association with the cost of margin trading or the cost of inventory.³⁹ Fourthly, a positive change in inflation may reduce liquidity since inflationary pressure may induce fund outflows, price declines and increased volatility in both the stock and bond market.⁴⁰

Fifthly, economic booms may positively influence stock market liquidity because the stock-market returns increase under good economic conditions and this attracts more funds and investors to the stock market.⁴¹ On the other hand, during times of economic distress, investors may shift their wealth from equities to safer and more liquid assets such as government bonds, with the result that economic conditions are positively associated with stock liquidity and negatively associated with bond liquidity. Finally, higher than expected economic growth could also negatively affect liquidity in both stock and bond markets due to the inflationary fears caused by the economic booms.

To test empirically the relationship between stock market and bond market liquidity and the wider market and macroeconomic behaviour, we run several time-series regressions. In order to control for the influence of share characteristics on stock liquidity, we use the characteristic-adjusted stock liquidity which is the liquidity that has not been explained by changes in the characteristics of stocks. That is, for each stock, we calculate actual liquidity minus the predicted

³⁹ Chordia et al., ‘Market liquidity’

⁴⁰ Fujimoto, ‘Macroeconomic sources’

⁴¹ Eisfeldt, ‘Endogenous liquidity’.

liquidity given the characteristics of the stock. The characteristic-adjusted stock market liquidity is the average of characteristic-adjusted liquidity for individual stocks. Bond market liquidity is the average liquidity for individual bonds. For the explanatory market variables, we calculated the average monthly returns on the equity market (*Stock return*) and bond market (*Bond return*)⁴² and the standard deviations of monthly price changes in stock and bond markets (*Stock volatility* and *Bond volatility*).

The explanatory macroeconomic variables include the change of inflation (*Inflation*) using data from O'Donoghue et al.⁴³, the discount rate on bills of exchange (*Bills rate*) obtained from the *National Bureau of Economic Research (NBER)*⁴⁴, and GDP growth (*GDP growth*), using data from Broadberry and van Leeuwen for pre-1830 and Mitchell for post-1830.⁴⁵

<<INSERT TABLE 8>>

In Table 8, we report the contemporaneous correlation among the changes in characteristic-adjusted stock liquidity, changes in bond liquidity, and the aforementioned explanatory variables. As can be seen from Table 8, changes in stock liquidity and bond liquidity

⁴² As *Global Financial Data* does not provide data on coupon rate, we manually took such information from the security description of the bonds. *Global Financial Data* does not report data on par value of the bonds either. We obtain par values from the *Course of Exchange*, *Investor's Monthly Manual* or *Railway Times*. For more than 90 per cent of the observations par value was £100. For bonds for which par value information could not be found, we assumed that the par value was £100 if the closing price for the bond in a month is between £80 and £100.

⁴³ O'Donoghue et al., 'Composite Price Index'.

⁴⁴ Bills rate from 1825 to 1857 was compiled by *NBER* from the British Parliamentary and it was for the 'first class' bills. Bills rate from 1858 to 1870 was computed by *NBER* from the weekly figures in *The Economist* and it was for 'Three months banker's bills'.

⁴⁵ Broadberry, S. N. and van Leeuwen, B. 'British economic growth'; Mitchell, B. R. 'British historical statistics'.

are positively correlated. It may be that liquidity in one market is influencing liquidity in the other market. Alternatively, the positive correlation may also appear if stock and bond liquidity were simultaneously influenced by other factors. In addition, Table 8 also shows that liquidity in both the stock market and bond market are significantly positively correlated with returns in these markets. That is, increased stock and bond prices are usually associated with increased liquidity.

<<INSERT TABLE 9>>

In Table 9 we regress the change in characteristics-adjusted stock liquidity and bond liquidity in year t on the chosen explanatory variables in year $t-1$. We can see that, except for its own value in year $t-1$, stock liquidity in year t can also be explained by bond return and bond volatility in the prior year, as shown in Column (4). For example, the coefficient on the lagged stock liquidity is -0.367 suggesting that when stock market liquidity in the previous year increases by one month, liquidity in the current year will decrease by 0.367 months. This could be an example of reversion to the mean, with temporary increases in liquidity in one year not being sustained.⁴⁶ The influence of bond returns on stock liquidity, although statistically significant, is however economically trivial. For example, when the bond returns in the prior year increase by 1 per cent, the stock liquidity in current year will increase by 0.01177, which is equivalent to 0.14 extra month of trading. Table 9 also indicates that none of the macroeconomic

⁴⁶ Note that the interpretations on the liquidity coefficients in Tables 6 and 9 are fundamentally different. The positive coefficient in lagged liquidity in Table 6 shows that the stock that was more liquid in the prior year continued to be more liquid than other stocks in the following year. However, the negative coefficient in lagged liquidity in Table 9 shows that stock market's liquidity level may mean revert. For example, while individual stock's liquidity may also have the feature of mean reversion, stocks that had greater liquidity in the prior year may still have greater liquidity than other stocks even after the reversion.

variables seem to be able to predict changes in stock liquidity. It is possible that there were few inter-linkages between the real economy and the equity market because the equity market in the nineteenth century was a small fraction of the economy compared to modern times.⁴⁷

In column 8 of Table 9, we see that the only variable that predicts changes in bond liquidity is previous changes in bond liquidity, once we include both market variables and economic variables as regressors. Although we find that stock market liquidity can be explained by bond market variables in column (4), the reverse relationship does not exist in column (8). This finding is consistent with the fact the value of the fixed-income market was more than four times that of the equity market.

IV

In this section, we employ a Fama-MacBeth regression analysis to examine whether investors priced liquidity in this period. One hypothesis is that investors in this early market may have been compensated with a higher return to hold less liquid securities.⁴⁸ An alternative hypothesis is that there was no illiquidity premium because investors did not value liquidity in this early market since nearly all of them were individuals who were buy-and-hold investors.

To analyse the determinants of returns there are two commonly used techniques. One approach is to sort securities into portfolios, and then use time-series regressions to examine if the returns on different portfolios move in similar ways.⁴⁹ Another approach is to run a series of cross-sectional regressions explaining the returns on each security in particular months, and then

⁴⁷ Acheson et al., ‘Rule Britannia’.

⁴⁸ Amihud, ‘Illiquidity’; Amihud and Mendelson, ‘Asset pricing’.

⁴⁹ Fama and French, ‘Common Risk Factors’

find whether on average the coefficients are significant, using Fama-MacBeth regressions.⁵⁰ As there is a relatively small number of securities in our sample compared to modern studies, the latter methodology is preferable. Furthermore, using this method enables us to control for other security characteristics that may be correlated with one another as well as liquidity.⁵¹

The Fama-MacBeth methodology is applied as follows. For each month of year t , we regress the return of an individual stock or bond on selected explanatory variables in year $t-1$. The first regression is for January 1828, and this process is then repeated for every month, until the last regression which is for December 1870. For example, for month 1, we regress the monthly percentage returns for the individual stocks on the lagged value of the explanatory variables for that stock, and obtain the coefficients from this regression. We then repeat this approach for month 2, and then month 3, and continue for all 516 months in our sample period.

For each of the explanatory variables, we have 516 values for the estimated coefficient, each corresponding to a month between January 1828 and December 1870. The time-series mean and standard error (the standard deviation divided by the square root of the number of months in our sample) of these 516 values of the coefficient are then calculated. The t-statistic is then calculated as the mean divided by the standard error.

When it comes to calculating stock returns from the *COE* data, one potential problem is that about 23 per cent of observations have no stock price quotations associated with them. We therefore use only the reported stock prices to calculate returns – we refer to this as the listwise method. However, missing prices may be symptomatic of illiquidity, thus introducing a potential bias. To address this problem, we use an alternative method in which, in months when prices

⁵⁰ Fama and MacBeth, ‘Risk’, Fama and French, ‘Cross-section’

⁵¹ Amihud and Mendelson, ‘Asset pricing’; Fama and French, ‘The value premium’, ‘Dissecting anomalies’.

were missing, we set stock returns equal to the average monthly returns for the same stock over the sample period – we refer to this as the mean return method.

Another potential problem for the stock return calculation is the potential delisting bias since the *COE* contains no information about the delisting return.⁵² As discussed in section two, we identified 112 cases of performance-related delisting and there were 111 stocks delisted for unknown reasons. We made two assumptions about the 111 stocks– (1) all 111 stocks delisted due to failure and (2) only stocks that were listed for more than 36 months before disappearing delisted due to failure. Using delisting assumption 1, there were 223 stocks designated as failed stocks and using delisting assumption 2, there are 171 stocks which were characterised as failed stocks. For both delisting assumptions, we assume a -40 per cent delisting return for the stocks that delisted due to failure and a 0 per cent delisting return for other delisted stocks.⁵³

Our liquidity variable is defined as per Equation 1 above, where liquidity equals 1 – proportion of months with zero returns over the past 12 months. However, for the sake of robustness, we also use an alternative definition of liquidity, where liquidity equals 1 – proportion of months with zero returns over the past 36 months.

We run different specifications for stocks and bonds due to the need to control for different explanatory variables. For stocks we include the following explanatory variables: (1) stock liquidity in year $t-1$ (*Stock liquidity*); (2) the natural logarithm of a stock's market capitalization at December of year $t-1$ (*Size*) as the size effect on returns has been well

⁵² Shumway, 'The delisting bias'; Shumway and Warther, 'The delisting bias'.

⁵³ In choosing a -40 per cent delisting return, we are following Shumway, 'The delisting bias', who finds -40 per cent delisting return on the modern-day NYSE and AMEX. Shumway and Warther, 'The delisting bias' find a -55 per cent delisting return for the stocks which delisted from the Nasdaq; using this delisting return does not change our findings. Our conclusions remain unchanged if we use -80% and -100% delisting return.

documented⁵⁴; (3) the dividend yield in year $t-1$, calculated as the sum of dividends paid in the year divided by the December stock price (*Value*)⁵⁵; as the value effect has also been shown to have an impact on returns⁵⁶ (4) the annual return of the stock in year $t-1$ (*Momentum*); as there is some evidence of momentum in returns⁵⁷; (5) the market risk of a stock in year $t-1$ (*Market beta*); (6) a binary variable which equals 1 if a stock has uncalled capital (*Uncalled capital*); (7) a binary variable which equals 1 if a stock has extended liability (*Extended liability*).⁵⁸ In addition, we include in the regression the stock return in the prior month (*Prior month return*) in order to control for the bid-ask bounce⁵⁹. We also run the same regressions with the delisting-bias-adjusted stock returns.

In order to test whether liquidity was priced in the London bond market, we regress the bond returns against bond liquidities, as well as several other common risk factors. The main specification we test for bonds includes the following variables simultaneously: (1) bond liquidity in year $t-1$ (*Bond liquidity*); (2) the market risk of a bond in year $t-1$ (*Market beta*); (3) the loading of a bond's return on term premium in year $t-1$ (*Term beta*); as there is evidence that

⁵⁴ Fama and French, 'Cross-section'

⁵⁵ According to Dimson et al., 'Capturing the value premium' the dividend yield is a good measure of value in the modern UK market.

⁵⁶ Fama and French, 'Cross-section'

⁵⁷ Jegadeesh and Titman, 'Buying winners'

⁵⁸ To reduce the errors-in-variables problem, the market risk of individual stocks is estimated as per Ye and Turner, 'The cross-section', p. 121.

⁵⁹ A transaction price can either be the bid price or the ask price. The "bouncing" of the transaction price between the bid and ask prices can induce negative autocorrelation in price changes. Including the lagged return as the explanatory variable is a commonly adopted strategy to control for the autocorrelation in stock returns.

the difference between short and long term bonds can explain returns⁶⁰, (4) the loading of a bond's return on default premium in year t-1 (*Default beta*); as there has been a suggestion that difference between safe and risky bonds can also explain returns⁶¹ (6) the bond return in the prior month (*Prior month return*); (7) a binary variable which equals 1 if a bond was issued by a British institution (e.g., government or corporates); and (8) a binary variable which equals 1 if a bond was issued by a government.

In calculating the various beta risks for individual stocks and bonds, Fama and MacBeth point out that the estimations of betas for individual securities are likely to contain large measurement errors.⁶² We therefore follow Fama and French and use betas for portfolios, which were measured with greater precision, to replace the betas of individual stocks/bonds.⁶³

In order to calculate the market beta for stocks, first, we calculated the equally-weighted market excess return. Second, we formed sixteen portfolios based on size (four quartiles) and dividend/price ratio (four quartiles) at December each year. The equally-weighted returns for the sixteen portfolios are calculated in the following year, and this process is repeated between 1826 and 1869 so that each portfolio has a time-series of monthly returns between January 1827 and December 1870. Third, we estimate the market betas for the sixteen portfolios by regressing the excess returns on each portfolio against the equally-weighted market excess return. Fourth, the beta of each stock in each year is the beta of the portfolio in which this stock is assigned to in that particular year.

⁶⁰ Fama and French, 'Common Risk Factors'

⁶¹ Fama and French, 'Common Risk Factors'

⁶² Fama and MacBeth, 'Risk-return'

⁶³ Fama and French, 'Cross-section'

For bonds, in order to estimate the market beta, term beta, and default beta, we follow Alquist and construct portfolios based on bond liquidity, and then estimate the bond portfolio's loadings on various risk factors.⁶⁴ First, we formed twenty portfolios based on an individual bond's liquidity in year $t-1$. We then calculated the equally weighted returns for these twenty portfolios in the following year (our conclusions are robust to using 10 or 16 portfolios). We repeated this process until we obtained the monthly return for each portfolio for each year between 1828 and 1870. Second, we calculated various risk factors. The market factor is basically the equally weighted returns on the stock market. We calculated the term factor to be the differential return between the Consols yield and short term bills rate. In order to calculate the default factor, we divided the bonds into two groups: bonds issued by the British government and other bonds. Since both foreign government bonds and corporate bonds contain greater default risk than the British government bonds, we calculated the default premium as the difference between returns on other bonds and returns on British government bonds. Third, we then regressed returns on the twenty portfolios against our market factor, term factor, and default factor in order to estimate each portfolio's loadings on these factors. Finally, the betas of each bond at each year are the betas of the portfolio in which this bond is assigned to in that particular year.

Table 10 reports the results from the Fama-MacBeth regressions for stocks. In column 1, we see that the coefficient on the liquidity variable in the univariate regression is negative and statistically significant, suggesting that illiquid stocks earn a higher return. However, when we introduce size into the regression, the coefficient is still negative, but is no longer significant, which suggests that the finding in the univariate regression is ultimately being driven by a size

⁶⁴ Alquist, 'Liquidity risk'.

effect. When we add in the other control variables in column 3, and when we make the delisting adjustments, we see that the liquidity coefficient remains insignificant, suggesting that investors did not price liquidity. Notably, the coefficients on other share characteristics such as beta risk, value, prior month return, and momentum are significantly different from zero, which is consistent with the stock return patterns in modern stock markets.

<<INSERT TABLE 10>>

To ensure that our results are not being driven by zero-liquidity stocks, we re-run our regression in column 3, but omit such stocks. The results in column 4 indicate that removing these stocks does not affect our finding. In the final two columns of Table 10 are the results of further robustness checks. In column 7, we use the mean return method rather than the listwise method to deal with missing price quotations when calculating returns and in column 8 we use an alternative definition of liquidity, where liquidity is calculated over a three-year window instead of a one-year window. As can be seen from Table 10, these robustness checks confirm that liquidity was not priced in this early capital market.

In Table 11, we report the Fama-MacBeth regression results for bond returns. Column 1 shows the coefficient from the univariate analysis. The coefficient on liquidity is not significantly different from zero suggesting that liquidity is not priced in the bond market. The results in columns (2) and (3) confirm this finding when several other risk factors and bond characteristics are controlled for. When we drop the bonds with zero liquidity from the sample (i.e., column 4) or when we use an alternative liquidity measure that was calculated using a three-year window (i.e., column 9), we find that liquidity is still not priced. Liquidity is also not priced for different subsets of bonds (columns 5 to 8).

<<INSERT TABLE 11>>

We have three main conclusions. First, the liquidity of the stock market trended upwards during this important growth phase in the UK stock market's evolution. We find that stock market liquidity during our sample period was partially influenced by the bond market, but it was not very sensitive to the macroeconomic environment. Bond liquidity tended to be higher than stock liquidity throughout most of this era, but they converged as time progressed.

Second, the main cross-sectional determinants of stock liquidity in this early capital market were firm size and the number of issued shares – larger firms with broad share issues had more liquid stock. The characteristics of stocks listed on the market changed over time, with the development of new large companies, such as the railways, which came to the market from the 1830s onwards, and this can explain much of the increase in stock liquidity which was observed over the sample period.

Our third and possibly most surprising finding from a modern-day perspective is that investors in this early capital market did not price liquidity in either stocks or bonds. It is possible that this is because our liquidity measure is not a perfect proxy for transaction costs, and it does not capture the trading quantity and price impacts dimensions of liquidity. However, from an historical perspective this finding may not be that surprising because investors in this market were individuals who invested for income and the long term. They therefore may not have placed a high value on liquidity.

The overall picture which emerges from this study is that the vast majority of stocks and bonds in this early capital market were illiquid, even at the end of our sample period. However, it is remarkable that despite this illiquidity, the UK capital market prospered in that it grew

substantially in terms of number of issues and market capitalisation. There was also an increase in participation, with equity investing being increasingly democratised throughout this period.⁶⁵

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⁶⁵ Rutterford et al., 'Who comprised', pp. 162-3.

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Figure 1. *Stock and bond liquidity on London Stock Exchange, 1825-1870*

Source: See text.

Figure 2. *Stock liquidity on London Stock Exchange
weighted equally and by value, 1825-1870*

Source: see text.

Figure 3. *Average market capitalisation of listed equity securities, 1825-1870*

Source: see text.

Figure 4. *Actual and predicted liquidity given the characteristics of stocks*

Source: see text.

Table 1. *Number of Securities Listed on the London Stock Exchange, 1825-70*

Year	Number of Equities	% of Equities						Number of Bonds	% of Bonds			
		Railways	Banks	Insurance	Canals	Infrastructure	Other		UK Govt	Foreign Govt	UK Corp	Foreign Corp
1825	161	1.2	1.2	12.1	28.5	13.9	43.0	47	16.0	80.0	4.0	0.0
1826	163	1.1	1.6	14.1	28.3	13.6	41.3	48	16.0	72.0	12.0	0.0
1827	169	1.7	1.7	16.3	33.7	14.6	32.0	50	15.1	75.5	9.4	0.0
1828	169	1.7	1.1	16.6	36.6	14.9	29.1	50	15.4	73.1	11.5	0.0
1829	165	1.7	1.2	15.7	36.6	15.1	29.7	46	17.0	78.7	4.3	0.0
1830	162	1.8	1.2	16.6	36.1	14.8	29.6	49	16.0	80.0	4.0	0.0
1831	160	1.8	1.2	17.1	36.6	15.2	28.0	52	15.1	83.0	1.9	0.0
1832	162	2.5	1.2	16.6	36.8	16.0	27.0	57	13.3	85.0	0.0	1.7
1833	168	4.7	1.2	15.7	34.9	15.1	28.5	62	12.1	86.4	0.0	1.5
1834	175	5.7	2.3	15.3	33.5	14.2	29.0	66	11.9	82.1	3.0	3.0
1835	213	9.7	6.5	14.4	28.2	12.0	29.2	74	9.2	81.6	2.6	6.6
1836	234	15.3	8.5	13.3	24.6	10.9	27.4	73	15.0	72.5	1.3	11.3
1837	226	15.6	9.8	13.1	24.2	9.4	27.9	78	14.5	71.1	0.0	14.5
1838	230	13.9	11.1	14.3	23.8	9.4	27.5	87	10.9	78.2	1.0	9.9
1839	223	15.6	12.8	14.8	23.5	7.4	25.9	73	13.3	77.8	1.1	7.8
1840	221	15.7	11.1	16.6	23.8	8.1	24.7	65	14.7	82.4	2.9	0.0
1841	223	18.8	10.3	16.2	23.1	8.5	23.1	65	16.4	82.1	1.5	0.0
1842	211	19.7	11.0	14.9	24.1	8.8	21.5	66	17.4	78.3	2.9	1.4
1843	205	21.7	9.2	15.2	23.0	8.8	22.1	63	13.5	81.1	2.7	2.7
1844	214	31.2	7.7	13.2	20.9	8.1	18.8	39	25.5	68.1	4.3	2.1
1845	228	43.5	6.1	11.1	18.3	5.7	15.3	40	23.9	69.6	4.3	2.2
1846	220	49.8	6.3	11.5	13.4	5.9	13.0	38	12.5	80.0	5.0	2.5
1847	244	55.4	5.9	10.7	10.7	5.2	12.2	35	14.3	82.9	2.9	0.0
1848	261	57.0	5.7	10.0	10.4	5.0	11.8	34	13.9	80.6	5.6	0.0
1849	244	54.7	6.0	11.3	10.6	5.3	12.1	40	12.2	75.6	7.3	4.9
1850	213	49.4	6.7	13.4	11.1	5.9	13.4	41	19.5	73.2	4.9	2.4
1851	209	42.2	7.8	15.1	11.6	6.0	17.2	48	18.4	67.3	12.2	2.0
1852	224	33.9	9.0	15.5	11.2	6.0	24.5	46	16.0	68.0	12.0	4.0
1853	253	29.7	9.1	15.2	9.9	6.8	29.3	58	8.6	62.1	22.4	6.9
1854	240	30.8	8.7	15.2	9.5	6.8	28.9	65	9.1	53.0	22.7	15.2
1855	227	27.1	10.4	15.1	10.0	8.0	29.5	85	5.8	39.5	20.9	33.7
1856	227	26.0	12.8	14.5	8.7	7.4	30.6	113	4.2	33.1	22.0	40.7
1857	246	24.0	11.4	12.5	8.0	7.6	36.5	107	3.7	34.9	22.9	38.5
1858	234	24.3	11.6	12.4	6.0	7.6	38.2	125	3.1	30.7	23.6	42.5
1859	235	23.3	12.1	12.5	4.3	7.0	40.9	148	3.3	32.0	24.7	40.0
1860	233	23.7	11.6	13.7	2.8	6.0	42.2	153	3.1	35.2	23.9	37.7
1861	240	21.5	12.2	14.6	2.0	6.1	43.5	165	3.0	36.1	26.0	34.9
1862	253	23.0	14.9	13.8	1.9	5.2	41.3	190	2.5	34.0	27.9	35.5
1863	281	21.1	20.1	13.2	1.3	4.3	40.1	191	2.0	45.5	15.7	36.9
1864	312	16.6	23.3	12.7	1.2	4.2	42.0	339	2.9	30.9	39.8	26.4
1865	323	15.1	23.6	11.7	1.1	3.4	45.0	385	3.8	31.7	42.5	22.0
1866	294	15.5	22.7	11.0	1.2	3.6	46.0	410	3.9	34.5	40.7	21.0
1867	279	15.0	21.6	11.3	1.3	4.0	46.8	430	3.8	33.9	40.2	22.1
1868	275	14.6	21.6	11.8	1.0	4.5	46.3	469	3.7	34.9	38.2	23.2
1869	274	14.3	20.8	11.3	1.0	4.4	48.1	492	3.6	38.1	32.1	26.3
1870	253	15.3	21.5	11.7	0.7	4.4	46.4	509	3.6	38.9	31.3	26.2

Notes: The infrastructure sector consists of bridges, docks, roads, and waterworks. The other sector includes gas-light and coke companies, mining firms, and industrial and commercial companies.

Table 2. *Average liquidity on London Stock Exchange by sector, 1825-1870*

Year	All Equities	Equities						All Bonds	Bonds			
		Railways	Banks	Insurance	Canals	Infrastructure	Other		UK Govt	Foreign Govt	UK Corp	Foreign Corp
1825	0.451	0.056*	0.833*	0.356	0.297	0.329	0.621	0.724	0.972*	0.692	0.375*	-
1826	0.374	0.708*	0.578*	0.316	0.286	0.348	0.445	0.652	0.940*	0.646	0.306*	-
1827	0.379	0.417*	0.750*	0.371	0.328	0.343	0.432	0.653	0.938*	0.634	0.350*	-
1828	0.332	0.417*	0.458*	0.333	0.270	0.292	0.419	0.585	0.896*	0.589	0.144*	-
1829	0.296	0.306*	0.417*	0.343	0.254	0.295	0.319	0.673	0.854*	0.652	0.333*	-
1830	0.290	0.278*	0.500*	0.348	0.183	0.310	0.371	0.627	0.948*	0.580	0.292*	-
1831	0.223	0.250*	0.417*	0.298	0.174	0.207	0.241	0.623	0.979*	0.568	0.167*	-
1832	0.251	0.188*	0.375*	0.361	0.193	0.212	0.286	0.648	0.896*	0.606	-	0.833*
1833	0.279	0.319*	0.875*	0.327	0.201	0.218	0.348	0.584	0.969*	0.533	-	0.417*
1834	0.268	0.353*	0.699*	0.318	0.184	0.210	0.317	0.539	0.927*	0.486	0.271*	0.708*
1835	0.272	0.451	0.334	0.275	0.176	0.252	0.299	0.526	0.905*	0.516	0.292*	0.212*
1836	0.324	0.676	0.322	0.286	0.176	0.241	0.314	0.567	0.805	0.569	0.300*	0.269*
1837	0.302	0.492	0.400	0.260	0.189	0.279	0.286	0.567	0.792	0.535	0.000*	0.500*
1838	0.301	0.680	0.390	0.249	0.115	0.262	0.274	0.514	0.886	0.515	0.400*	0.108*
1839	0.329	0.677	0.371	0.252	0.205	0.292	0.266	0.492	0.826	0.477	0.250*	0.095*
1840	0.363	0.822	0.444	0.256	0.228	0.268	0.266	0.587	0.825	0.533	0.917*	0.000*
1841	0.362	0.772	0.544	0.228	0.190	0.292	0.238	0.510	0.848	0.436	0.833*	0.000*
1842	0.380	0.811	0.561	0.270	0.184	0.242	0.247	0.581	0.792	0.526	0.955*	0.250*
1843	0.418	0.816	0.608	0.293	0.223	0.272	0.296	0.617	0.883	0.568	0.917*	0.444*
1844	0.474	0.873	0.583	0.320	0.168	0.311	0.285	0.721	0.763	0.705	0.875*	0.444*
1845	0.507	0.861	0.542	0.178	0.156	0.256	0.239	0.729	0.576	0.781	1.000*	0.222*
1846	0.531	0.812	0.516	0.217	0.150	0.250	0.258	0.717	0.817	0.703	1.000*	0.083*
1847	0.563	0.797	0.417	0.256	0.158	0.357	0.287	0.762	0.883	0.741	0.750*	0.000*
1848	0.542	0.721	0.453	0.280	0.164	0.357	0.360	0.747	0.933	0.721	0.655*	0.000*
1849	0.517	0.674	0.516	0.302	0.188	0.364	0.362	0.736	0.917	0.720	0.712*	0.567*
1850	0.510	0.699	0.495	0.265	0.190	0.374	0.393	0.738	0.625	0.783	0.750*	0.250*
1851	0.494	0.752	0.537	0.293	0.127	0.310	0.329	0.678	0.648	0.672	0.789	0.500*
1852	0.561	0.827	0.675	0.331	0.115	0.411	0.534	0.812	0.917	0.789	0.847	0.675*
1853	0.536	0.700	0.706	0.305	0.150	0.377	0.605	0.758	0.900*	0.789	0.573	0.894*
1854	0.512	0.703	0.692	0.261	0.260	0.398	0.496	0.710	0.917*	0.721	0.617	0.685
1855	0.493	0.643	0.696	0.279	0.150	0.373	0.543	0.761	0.850*	0.823	0.617	0.763
1856	0.532	0.718	0.734	0.325	0.147	0.426	0.521	0.700	0.911*	0.764	0.587	0.689
1857	0.522	0.715	0.761	0.347	0.212	0.384	0.477	0.674	0.958*	0.668	0.597	0.699
1858	0.550	0.706	0.787	0.370	0.229	0.475	0.502	0.706	0.958*	0.795	0.570	0.698
1859	0.569	0.741	0.724	0.290	0.288	0.394	0.570	0.694	0.967*	0.783	0.626	0.643
1860	0.602	0.733	0.765	0.392	0.327*	0.544	0.577	0.689	0.933*	0.795	0.514	0.681
1861	0.593	0.837	0.728	0.397	0.250*	0.428	0.540	0.661	0.983*	0.725	0.492	0.692
1862	0.638	0.802	0.830	0.387	0.583*	0.607	0.566	0.667	0.917*	0.773	0.499	0.679
1863	0.648	0.748	0.870	0.405	0.396*	0.481	0.591	0.634	0.958*	0.771	0.202	0.631
1864	0.666	0.781	0.870	0.408	0.500*	0.521	0.605	0.616	0.750	0.702	0.580	0.557
1865	0.639	0.785	0.830	0.407	0.354*	0.578	0.561	0.621	0.728	0.729	0.557	0.572
1866	0.609	0.779	0.797	0.458	0.125*	0.497	0.516	0.586	0.630	0.711	0.506	0.527
1867	0.610	0.791	0.730	0.404	0.458*	0.588	0.553	0.640	0.708	0.771	0.506	0.539
1868	0.607	0.798	0.697	0.397	0.417*	0.583	0.565	0.662	0.676	0.769	0.578	0.591
1869	0.617	0.798	0.706	0.388	0.306*	0.622	0.621	0.665	0.644	0.736	0.623	0.616
1870	0.647	0.852	0.684	0.432	0.500*	0.329	0.445	0.658	0.624	0.746	0.601	0.599
Mean	0.467	0.655	0.620	0.322	0.242	0.372	0.419	0.652	0.847	0.671	0.568	0.524

Notes: * signifies a small number of securities in category. The infrastructure sector consists of bridges, docks, roads, and waterworks. The other sector includes gas-light and coke companies, mining firms, and industrial and commercial companies.

Table 3. *Number of securities and average liquidity on London Stock Exchange for securities entering and exiting, 1825-1870*

Year	Equities						Bonds					
	Number of Securities			Liquidity			Number of Securities			Liquidity		
	Entries	Exits	Others	Entries	Exits	Others	Entries	Exits	Others	Entries	Exits	Others
1825	-	4	-	-	0.766	-	0	3	-	-	0.667	-
1826	23	21	140	0.210	0.545	0.372	6	5	44	0.490	0.167	0.698
1827	17	11	152	0.295	0.467	0.383	7	5	44	0.314	0.722	0.703
1828	7	7	162	0.157	0.338	0.339	5	5	46	0.381	0.125	0.705
1829	3	7	162	0.095	0.077	0.311	5	9	41	0.761	0.208	0.685
1830	5	8	157	0.124	0.369	0.292	6	3	43	0.378	0.600	0.669
1831	2	4	158	0.146	0.031	0.229	9	6	43	0.811	0.196	0.623
1832	3	1	159	0.000	0.000	0.257	11	6	47	0.611	0.183	0.710
1833	10	4	158	0.539	0.222	0.264	13	8	49	0.431	0.420	0.657
1834	8	1	167	0.560	0.000	0.255	14	10	52	0.453	0.708	0.556
1835	41	3	172	0.287	0.000	0.273	12	4	63	0.599	0.132	0.649
1836	35	14	199	0.532	0.149	0.300	23	24	51	0.543	0.570	0.579
1837	11	19	216	0.355	0.481	0.285	21	16	60	0.567	0.281	0.610
1838	19	15	212	0.509	0.219	0.288	30	21	63	0.397	0.349	0.612
1839	15	22	210	0.407	0.221	0.333	10	24	64	0.467	0.272	0.579
1840	14	16	207	0.474	0.273	0.361	5	13	60	0.497	0.450	0.625
1841	13	11	210	0.589	0.239	0.354	13	13	52	0.483	0.126	0.594
1842	5	17	206	0.400	0.373	0.381	14	13	52	0.545	0.313	0.659
1843	8	14	197	0.447	0.466	0.413	17	20	49	0.382	0.454	0.813
1844	32	23	182	0.774	0.508	0.414	7	31	33	0.357	0.590	0.841
1845	54	40	177	0.813	0.399	0.433	10	9	30	0.447	0.731	0.833
1846	26	34	194	0.787	0.563	0.488	5	7	33	0.798	0.461	0.737
1847	58	34	188	0.773	0.753	0.473	0	3	35	-	0.083	0.782
1848	35	18	226	0.598	0.525	0.535	2	3	32	0.489	0.533	0.776
1849	6	23	238	0.207	0.730	0.503	7	1	33	0.650	0.462	0.782
1850	12	43	201	0.320	0.642	0.493	4	3	37	0.417	-	0.773
1851	22	26	187	0.431	0.744	0.469	8	1	41	0.654	0.438	0.709
1852	25	10	199	0.709	0.774	0.531	6	8	40	0.850	0.883	0.797
1853	40	11	213	0.584	0.631	0.522	14	2	44	0.734	0.611	0.776
1854	12	25	229	0.657	0.568	0.499	14	7	51	0.687	0.398	0.783
1855	11	25	216	0.476	0.396	0.506	32	12	54	0.699	0.750	0.800
1856	17	17	211	0.569	0.514	0.530	41	13	73	0.589	0.682	0.771
1857	36	17	210	0.417	0.427	0.548	8	14	99	0.650	0.367	0.685
1858	6	18	229	0.383	0.261	0.574	22	4	104	0.781	0.485	0.722
1859	23	22	214	0.674	0.464	0.568	39	16	109	0.739	0.576	0.690
1860	16	18	217	0.581	0.505	0.611	23	18	131	0.653	0.644	0.701
1861	14	7	226	0.615	0.510	0.594	25	13	141	0.673	0.367	0.698
1862	30	17	223	0.758	0.695	0.616	49	24	141	0.679	0.490	0.716
1863	54	26	228	0.767	0.648	0.620	51	50	140	0.641	0.518	0.645
1864	52	21	260	0.797	0.737	0.634	170	22	170	0.639	0.492	0.605
1865	40	29	284	0.696	0.693	0.625	64	18	323	0.563	0.352	0.638
1866	15	44	280	0.582	0.737	0.589	36	11	376	0.606	0.612	0.584
1867	13	28	266	0.861	0.681	0.591	44	24	389	0.682	0.406	0.642
1868	11	15	264	0.751	0.672	0.597	53	14	419	0.696	0.637	0.674
1869	20	21	255	0.781	0.582	0.607	-	-	-	-	-	-
1870	0	21	253	-	0.837	0.631	45	28	464	0.821	0.533	0.648
Mean	20	18	207	0.511	0.466	0.455	27	17	105	0.592	0.464	0.692

Notes: The number of securities represents the statistics at the end of each year. We define a share as entering if it was newly listed between January and December of year t , and as exiting if it was delisted between January and December of year t . Entries and exits is blank for bonds in 1869 as there is a change in the data source from GFD to IMM this year which makes it difficult to evaluate whether changes in bond listings are true entries or exits.

Table 4. *Mean of selected share characteristics, 1825-1870*

	1825	1845	1865	1825 - 1870
Share denomination	100	67	51	68
Uncalled capital	0.56	0.55	0.51	0.44
Extended liability	0.26	0.17	0.21	0.23
Dividend (£)	3.72	2.94	1.97	3.03
Div/Par (%)	3.97	6.17	9.74	6.85
Market capitalisation	264,348	500,714	859,042	586,852
No. shares	8,328	17,275	26,617	20,959
Stock return (%)	-2.59	0.91	0.65	0.53
No. stocks	161	228	323	226

Notes: *Share denomination*, *Number of shares*, and *Market capitalisation* are based on the values at the end of year t ; *Uncalled capital* is a binary variable which equals 1 if a share has unpaid capital attached to it, 0 otherwise; *Extended liability* is a binary variable equal to 1 if the company had extended shareholder liability, 0 if liability was limited; *Dividend* is the dividend payment during year t ; *Div/Par* is the dividend expressed as a percentage of the stock's paid-up or par value at year t ; *Stock return* is average monthly total return for the stock in the year i.e., capital appreciation plus monthly dividend yield. To obtain the dividend yield for the month, we divide the yearly dividends by 12 and use the last month's price as the denominator. *No. stocks* at 1825, 1845 and 1865 are the number of stocks that were used to calculate the summary statistics at each year. *No. stocks* over 1825-1870 is the average number of stocks at the end of each year over 1825 to 1870.

Table 5. *Correlations among stock liquidity and share characteristics*

	Stock liquidity	Share denom.	Uncalled capital	Extended liability	Dividend	Div/Par	Size	No. shares	Stock return
Stock liquidity	1.000								
Share denom	-0.146***	1.000							
Uncalled capital	0.056***	-0.005	1.000						
Extended liability	-0.090***	0.087***	0.366***	1.000					
Dividend	-0.129***	0.246***	-0.200***	-0.091***	1.000				
Div/Par	-0.042***	-0.100***	-0.030***	0.038***	0.366***	1.000			
Size	0.496***	0.214***	-0.092***	0.070***	0.121***	0.094***	1.000		
No. shares	0.556***	-0.377***	0.290***	0.163***	-0.357***	-0.149***	0.504***	1.000	
Stock return	0.034***	-0.033***	0.023**	0.003	-0.007	0.019**	0.119***	0.043***	1.000

Notes: *, **, and *** indicates significance level of 10 per cent, 5 per cent and 1 per cent respectively.

Table 6: Cross-sectional determinants of stock liquidity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Liquidity _{t-1}	0.329*** (12.03)	0.357*** (12.57)	0.419*** (14.03)	0.418*** (13.98)	0.413*** (13.82)	0.418*** (13.89)	0.418*** (13.91)	0.417*** (13.83)	0.679*** (27.95)	0.310*** (12.29)	0.311*** (12.34)
Size _{t-1}	0.086*** (17.99)									0.070*** (11.18)	0.066*** (10.22)
No. shares _{t-1}		0.085*** (12.71)								0.046*** (5.63)	0.050*** (6.16)
Share denom _{t-1}			0.019** (-2.00)							-0.007 (-0.85)	-0.004 (-0.51)
Uncalled capital _{t-1}				0.008 (0.44)						0.023* (1.68)	0.022 (1.49)
Extended liability _{t-1}					-0.108*** (-4.07)					0.095*** (-3.69)	0.094*** (-3.66)
Dividend _{t-1}						0.000 (0.43)				-0.001 (-0.95)	
Div/Par _{t-1}							0.198*** (3.24)				0.022 (0.36)
Stock return _{t-1}								0.407*** (2.97)		-0.052 (-0.44)	-0.036 (-0.31)
IPO									0.105*** (3.28)	0.106 (1.38)	0.105 (1.37)
Constant	0.829*** (-14.19)	0.580*** (-9.85)	0.216*** (4.82)	0.140*** (5.12)	0.157*** (6.03)	0.142*** (5.46)	0.134*** (5.25)	0.141*** (5.47)	0.226*** (10.03)	0.1019*** (-15.14)	0.1021*** (-15.07)
Industry controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	10,059	10,059	10,059	10,059	10,059	10,059	10,059	10,059	10,059	10,059	10,059
R-squared	0.562	0.546	0.460	0.457	0.462	0.457	0.460	0.458	0.494	0.596	0.596

Notes: The stock liquidity in year t is regressed on the chosen explanatory variables in year $t-1$. Stock liquidity is calculated as the proportion of months in the year that a stock had a non-zero return. Size is the natural logarithm of total market capitalisation of the company; No. shares is the natural logarithm of number of issued shares; Share denom is the natural logarithm of nominal value of the share; Uncalled capital is a binary variable which equals 1 if a share has unpaid capital attached to it, 0 otherwise; Extended liability is a binary variable equal to 1 if the company had extended shareholder liability, 0 if liability was limited; Dividend is the dividend payment; Div/Par is the dividend expressed as a percentage of the stock's paid-up or par value; Stock return is average monthly return for the stock in the year. IPO equals 1 if the stock was listed within the last 12 months, 0 otherwise. Industry controls include a series of dummy variables that each represents one industry. t -Statistics are in parentheses and *, **, and *** indicates significance level of 10 per cent, 5 per cent and 1 per cent respectively.

Table 7. Cross-sectional determinants of stock liquidity in subsamples

	Railway shares		Non-railway shares		Fully-paid shares	
	(1)	(2)	(3)	(4)	(5)	(6)
Liquidity _{t-1}	0.557*** (13.42)	0.564*** (13.67)	0.266*** (10.05)	0.267*** (10.09)	0.286*** (8.57)	0.286*** (8.62)
Size _{t-1}	0.046*** (4.18)	0.039*** (3.63)	0.075*** (10.27)	0.070*** (9.29)	0.074*** (8.18)	0.064*** (7.06)
No. shares _{t-1}	0.025 (1.52)	0.029* (1.69)	0.050*** (5.92)	0.054*** (6.31)	0.046*** (3.95)	0.057*** (4.96)
Share denom _{t-1}	0.034** (2.17)	0.027* (1.66)	-0.011 (-1.23)	-0.008 (-0.87)	-0.007 (-0.58)	0.003 (0.19)
Uncalled capital _{t-1}	0.028 (1.45)	0.034* (1.76)	0.021 (1.11)	0.018 (0.95)		
Extended liability _{t-1}			-0.098*** (-3.69)	-0.098*** (-3.67)	-0.054 (-1.49)	-0.053 (-1.48)
Dividend _{t-1}	-0.010*** (-2.62)		-0.001 (-0.58)		-0.001 (-0.71)	
Div/Par _{t-1}		-0.186* (-1.78)		0.027 (0.39)		0.103 (1.13)
Stock return _{t-1}	0.066 (0.30)	0.097 (0.43)	-0.026 (-0.17)	-0.009 (-0.07)	0.031 (0.15)	0.080 (0.40)
IPO	-0.022 (-0.31)	-0.022 (-0.31)	0.197** (2.42)	0.196** (2.42)	-0.166* (-1.94)	-0.162* (-1.86)
Constant	-0.689*** (-4.92)	-0.633*** (-4.57)	-1.058*** (-13.93)	-1.061*** (-13.93)	-1.077*** (-13.10)	-1.088*** (-12.83)
Industry controls	NO	NO	YES	YES	YES	YES
Observations	2,153	2,153	7,906	7,906	5,691	5,691
R-squared	0.492	0.489	0.534	0.534	0.650	0.650

Notes: The stock liquidity in year t is regressed on the chosen explanatory variables in year $t-1$. Stock liquidity is calculated as the proportion of months in the year that a stock had a non-zero return. Size is the natural logarithm of total market capitalisation of the company; No. shares is the natural logarithm of number of issued shares; Share denomination is the natural logarithm of nominal value of the share; Uncalled capital is a binary variable which equals 1 if a share has unpaid capital attached to it, 0 otherwise; Extended liability is a binary variable equal to 1 if the company had extended shareholder liability, 0 if liability was limited; Dividend is the dividend payment; Div/Par is the dividend expressed as a percentage of the stock's paid-up or par value; Stock return is average monthly return for the stock in the year. IPO equals 1 if the stock was listed within the last 12 months, 0 otherwise. Industry controls include a series of dummy variables that each represents one industry. t -Statistics are in parentheses and *, **, and *** indicates significance level of 10 per cent, 5 per cent and 1 per cent respectively.

Table 8. *Correlation coefficients of the changes in characteristic-adjusted stock liquidity, changes in bond liquidity and selected market and macroeconomic variables*

	Δ Stock liquidity	Δ Bond liquidity	Stock return	Stock volatility	Bond return	Bond volatility	GDP growth	Inflation	Bills rate
Δ Stock liquidity	1.000								
Δ Bond liquidity	0.400***	1.000							
Stock return	0.380**	0.372**	1.000						
Stock volatility	0.022	-0.014	0.103	1.000					
Bond return	0.239	0.293*	0.577***	0.076	1.000				
Bond volatility	0.256*	0.100	0.001	0.369**	0.186	1.000			
GDP growth	-0.325**	-0.098	-0.128	0.201	-0.119	-0.102	1.000		
Inflation	-0.319**	-0.047	-0.387***	0.207*	-0.495***	-0.192	0.430***	1.000	
Bills rate	-0.206	-0.215	-0.365**	-0.046	-0.376**	-0.151	0.188	0.325**	1.000

Notes: Δ *Stock liquidity* is the first difference of the share characteristics adjusted stock market liquidity in year t ; Δ *Bond liquidity* is the first difference of the bond market liquidity in year t ; *Stock return* and *Bond return* are the average monthly returns on the equity market and bond market in year t respectively; *Stock market volatility* and *Bond market volatility* are the standard deviations of monthly price changes in stock market and bond market in year t respectively; *GDP growth* is the growth rate of annual GDP data obtained from Broadberry and van Leeuwen, ‘British economic growth’ for pre-1830 and Mitchell, *British historical statistics* for post-1830; *Inflation* is the annual change of CPI using data from O’Donoghue et al.; *Bills rate* is the discount rate in the bills of exchange obtained from the *NBER*.

Table 9. *Time-series determinants of changes in stock and bond liquidity*

	Δ Stock liquidity				Δ Bond liquidity			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Stock liquidity _{t-1}	-0.271** (-2.37)			-0.367*** (-3.00)	-0.310 (-1.46)			-0.179 (-0.82)
Stock return _{t-1}	-1.031** (-2.05)			-0.522 (-0.71)	-1.280** (-2.14)			-1.399 (-1.23)
Stock vol. _{t-1}	0.079 (0.35)			-0.242 (-0.96)	-0.023 (-0.06)			-0.317 (-0.52)
Δ Bond liquidity _{t-1}		-0.115 (-1.09)		-0.063 (-0.68)		-0.367** (-2.64)		-0.340** (-2.05)
Bond return _{t-1}		-0.340 (-0.85)		1.177* (1.93)		0.420 (0.42)		1.538 (0.88)
Bond vol. _{t-1}		0.435 (1.41)		0.782* (1.97)		0.329 (0.70)		0.491 (0.73)
GDP growth _{t-1}			-0.070 (-0.50)	-0.166 (-1.48)			0.143 (0.73)	0.009 (0.04)
Inflation _{t-1}			0.092 (0.98)	0.143 (1.48)			0.028 (0.21)	0.124 (0.78)
Bills rate _{t-1}			0.367 (1.43)	0.380 (1.51)			-0.235 (-0.72)	-0.478 (-1.14)
Constant	0.001 (0.03)	-0.017 (-1.26)	-0.014 (-1.27)	-0.038 (-1.50)	0.009 (0.30)	-0.017 (-0.84)	0.007 (0.44)	0.013 (0.32)
Observations	43	43	43	43	43	43	43	43

Notes: The change in characteristics-adjusted stock market liquidity in year t is regressed on the chosen explanatory variables in year $t-1$. Δ Adjusted stock liquidity is the first difference of the share characteristics adjusted stock market liquidity in year $t-1$; Δ Bond liquidity is the first difference of the bond market liquidity in year $t-1$; *Stock return* and *Bond return* are the average monthly returns on the equity market and bond market in year $t-1$ respectively; *Stock market volatility* and *Bond market volatility* are the standard deviations of monthly price changes in stock market and bond market in year $t-1$ respectively; *GDP growth* is the growth rate of annual GDP data; *Inflation* is the annual change of inflation; *Bills rate* is the discount rate of bills of exchange. t -Statistics are in parentheses and *, **, and *** indicates significance level of 10 per cent, 5 per cent and 1 per cent respectively. They are calculated using the Newey-West standard errors.

Table 10. *Fama-MacBeth regression results for stocks*

	<u>Listwise method</u>				Delisting assumption 1	Delisting assumption 2	Mean return method	Alternative liquidity definition
	Unadjusted returns (1)	Unadjusted returns (2)	Unadjusted returns (3)	Unadjusted returns (4)				
Stock liquidity _{t-1}	-0.483** (-2.35)	-0.144 (-0.55)	-0.176 (-0.80)	-0.287 (-1.22)	-0.117 (-0.53)	-0.136 (-0.61)	-0.021 (-0.12)	0.062 (0.25)
Size _{t-1}		-0.138*** (-3.15)	-0.124*** (-3.33)	-0.126*** (-3.12)	-0.065* (-1.73)	-0.076** (-2.03)	-0.057** (-2.15)	-0.092** (-2.36)
Ext. liability _{t-1}			0.006 (0.07)	-0.026 (-0.29)	0.051 (0.58)	0.045 (0.52)	-0.004 (-0.07)	-0.036 (-0.45)
Uncalled capital _{t-1}			0.214** (2.46)	0.242*** (2.64)	0.133 (1.48)	0.148* (1.66)	0.259*** (4.22)	0.240*** (3.00)
Value _{t-1}			6.889*** (4.29)	7.185*** (4.16)	7.185*** (4.32)	7.032*** (4.26)	5.104*** (5.03)	6.335*** (3.93)
Market Beta _{t-1}			0.417*** (3.18)	0.404*** (2.87)	0.418*** (3.12)	0.420*** (3.18)	0.283*** (3.13)	0.342*** (2.63)
Prior month return			-0.105*** (-11.54)	-0.108*** (-11.20)	-0.100*** (-10.92)	-0.100*** (-10.92)	-0.052*** (-5.95)	-0.102*** (-10.31)
Momentum _{t-1}			0.006*** (2.70)	0.006*** (2.68)	0.008*** (3.65)	0.008*** (3.49)	0.009*** (5.41)	0.008*** (3.45)
Constant	1.09*** (10.29)	2.641*** (5.09)	1.737*** (3.53)	1.853*** (3.43)	0.880* (1.77)	1.044** (2.10)	0.841*** (2.60)	1.205** (2.38)
Obs	75,266	75,266	74,683	67,736	74,683	74,683	102,495	62,772
Months	516	516	516	516	516	516	516	516
Equities/Month	146	146	145	131	145	145	199	123
Adjusted R ²	0.023	0.034	0.118	0.123	0.114	0.114	0.086	0.131

Notes: The Fama-MacBeth regressions are carried out by regressing the monthly percentage returns on individual stocks in year t on explanatory variables for the same stock in year $t-1$. *Stock liquidity* is defined as $1 -$ proportion of months with zero returns over the past 12 months. The alternative definition of liquidity used in the specification in column 7 is $1 -$ proportion of months with zero returns over the past 36 months. *Size* is the natural logarithm of the market capitalization of the stock in December of year $t-1$. *Value* is the dividend yield of the stock in year $t-1$. *Market Beta* represents the market risk of individual stock in year $t-1$. *Prior month return* is the total return for the stock in the prior month. *Momentum* is the total return for the stock in year $t-1$. *Uncalled capital* is a binary variable which equals 1 if a share has unpaid capital attached to it, 0 otherwise; *Extended liability* is a binary variable equal to 1 if the company had extended shareholder liability, 0 if liability was limited; The *Obs* row shows the number of observations in the regression. See text for the details of the two delisting assumptions. R^2 s are adjusted for degrees of freedom. t -Statistics are in parentheses and *, **, and *** indicate significance level of 10%, 5% and 1% respectively.

Table 11. *Fama-MacBeth regression for bonds*

	All bonds				UK Govt bonds	Foreign Govt bonds	Govt bonds	Corporate bonds	Alternative liquidity definition
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bond Liquidity _{t-1}	-0.067 (-0.46)	-0.048 (-0.23)	0.078 (0.36)	0.040 (0.18)	-0.120 (-0.29)	0.074 (0.35)	0.053 (0.23)	0.131 (0.64)	-0.152 (-0.59)
Market Beta _{t-1}		-0.140 (-0.45)	-0.146 (-0.46)	-0.161 (-0.50)			-0.203 (-0.66)	-0.383 (-0.40)	-0.369 (-1.06)
Term Beta _{t-1}		0.028 (0.49)	0.044 (0.78)	0.044 (0.78)			0.039 (0.66)	0.133 (0.69)	0.021 (0.35)
Default Beta _{t-1}		0.259 (1.44)	0.259 (1.51)	0.242 (1.41)			0.306 (1.59)	-0.029 (-0.24)	0.194 (0.98)
Prior month return		-0.040* (-1.75)	-0.052** (-2.31)	-0.054** (-2.36)			-0.068*** (-2.90)	0.173 (1.07)	-0.095*** (-3.80)
Momentum _{t-1}		0.018*** (2.79)	0.017** (2.57)	0.017** (2.57)			0.023*** (3.42)	-0.049 (-1.42)	0.019** (1.99)
Government			-0.010 (-0.08)	-0.005 (-0.04)					0.107 (0.83)
UK			-0.201* (-1.86)	-0.201* (-1.85)			-0.200* (-1.83)	-0.663 (-1.49)	-0.092 (-0.81)
Constant	0.813*** (7.39)	-1.325* (-1.82)	-1.265* (-1.68)	-1.235 (-1.63)	0.395 (0.97)	0.855*** (6.14)	-1.933** (-2.51)	6.234* (1.72)	-1.352 (-1.27)
Obs	46,456	46,233	46,233	45,524	3,036	21,520	24,428	21,805	30,342
Months	516	516	516	516	516	516	516	285	516
Bonds/Month	90	90	90	90	6	42	48	42	90
Adjusted R ²	0.039	0.342	0.383	0.384	0.304	0.059	0.424	0.471	0.461

Notes: The Fama-MacBeth regressions are carried out by regressing the monthly percentage returns on individual bonds in year t on explanatory variables for the same bond in year $t-1$. *Bond liquidity* is defined as 1 – proportion of months with zero returns over the past 12 months. The alternative definition of liquidity used in the specification in column 9 is 1 – proportion of months with zero returns over the past 36 months. *Market beta* is the market risk of a bond in year $t-1$. *Term beta* is the loading of a bond's return on term premium in year $t-1$. *Default beta* is the loading of a bond's return on default premium in year $t-1$. *Prior month return* is the total return for the bond in the prior month. *Momentum* is the total return for the bond in year $t-1$. *Government* is a binary variable which equals 1 if a bond was issued by a British institution. *UK* is a binary variable which equals 1 if a bond was issued by a government. The Obs row shows the number of observations in the regression. t-statistics are in parentheses and *, **, and *** indicate significance level of 10%, 5% and 1% respectively.