Jan 6, 2025

The January Effect Before Tax-Loss Selling and Window-Dressing

Aditya Kaul[1], Vikas Mehrotra[2], Randall Morck[3] and Blake Phillips[4]

ABSTRACT

We use comprehensive 1874-1917 stock-level NYSE data to examine the January effect, making two contributions. First, we document a 3.1 percent increase in stock prices in January. As this period precedes income taxes and modern institutional investors, the accepted tax-loss selling and institutional window dressing explanations for the January effect are incomplete. Second, we find that returns are larger for stocks with the highest arbitrage costs: small stocks, stocks with capital losses, illiquid stocks and volatile stocks. These results point to an important role for arbitrage costs in sustaining the January effect, as conjectured by Roll (1983).

JEL CODES: G11, G12, G14, G41
KEYWORDS: January effect; Anomaly; Tax-loss; Window-dressing

[1] School of Business, University of Alberta, Edmonton, AB, Canada, T6G 2R6

[2] School of Business, University of Alberta, Edmonton, AB, Canada, T6G 2R6

[3] School of Business, University of Alberta, Edmonton, AB, Canada, T6G 2R6

[4] School of Accounting and Finance, University of Waterloo, ON, Canada, N2L 3G1

1. Introduction

Repetitive patterns in stock returns should disappear as arbitrageurs discover and exploit them. Yet, a predictable jump in stock prices in early January (termed the January effect) has persisted since Wachtel first identified it in 1942, and transcends both country boundaries (Gultekin and Gultekin, 1983) and asset classes.[1] There are two widely accepted explanations for the January effect: tax-loss selling[2] (Branch, 1977) and institutional window-dressing[3] (Lakonishok, Shleifer and Thaler, 1991). Neither explanation is complete because arbitrage should have eliminated the January effect soon after the appearance of Wachtel's paper (Roll, 1983; Constantinides, 1984). The persistence of the January effect suggests that arbitrage is impeded by transactions costs or risks inherent in its implementation (Roll, 1983; Shleifer and Vishny, 1997). An ideal setting in which to examine the importance of such impediments is one devoid of taxes and modern institutional investors.

In this paper, we examine the January effect using a novel, hand-collected dataset comprising the universe of New York Stock Exchange (NYSE) stocks over the 1874–1917 period, which is free of taxes and institutional investors.[4] If the January effect is present in this period, it cannot be because of tax loss selling or institutional window dressing, and

---

[1] Chang and Pinegar (1986) and Jordan and Jordan (1991) find evidence of a January seasonality in government bond yields.

[2] Tax-loss selling refers to investors selling stocks whose prices have fallen to generate capital loss related tax deductions prior to each year-end.

[3] Window-dressing refers to institutional investors selling underperforming stocks just prior to the year-end to improve the appearance of their portfolio holdings reports.

[4] We are not the first to look at pre-tax data. Three other studies (Schultz, 1985; Jones et al., 1987; and Jones et al., 1991) have looked at portions of our sample period and reach differing conclusions. These studies are discussed in Section 2.1.

other explanations must be sought. Our data include the total return (including dividends) and trading volume and encompass a considerably longer period and a larger set of stocks than in extant pre-tax studies. Importantly, our data are at the stock level, and allow us to examine cross-sectional variation in the strength of the January effect. We begin by analyzing the role of size and capital gains—proxies for tax-loss selling / window dressing used in the literature. To these, we add two variables that correlate with arbitrage costs: stock return volatility and illiquidity. Illiquidity is included to capture the effects of transactions costs, and volatility the effects of the risk inherent in conducting arbitrage.

Our analysis produces three key results. First, over 1874-1917, there is a strong January effect at the market level: the mean equal-weighted market return is 3.1% for the month of January, significantly larger than the 0.8% mean return in other months. Second, the risk-adjusted return in January is higher for small stocks, for stocks with capital losses, for volatile stocks and for illiquid stocks, while the differences during the remaining months are economically weaker, at most a fifth of those in January. For instance, the smallest (quintile 1) stocks have a risk-adjusted January return of 5.2% compared to -0.1% for the largest (quintile 5) stocks; the risk-adjusted January returns for stocks with the largest capital losses and the largest capital gains are 4.9% and -0.5%. Third, trading activity rises in January in relation to the other months, with the largest increases occurring for the smallest stocks, for stocks with the largest capital losses, and for the most volatile stocks; the least liquid stocks see the second largest increase in January trading. Healthy January trading suggests that the January effect is associated with active allocations to these stocks as opposed to risks which should deter investor participation.

Nevertheless, we consider the possibility that the high January returns reflect seasonal risk. By calculating portfolio alphas, we control for systematic risk. However, other unobserved risks might exhibit a seasonal pattern. Following Schwert (1989), we calculate monthly market volatility and monthly industrial production growth volatility as proxies for such risks. Neither is systematically higher in January. Likewise, we examine whether January illiquidity is high, using the Amihud Illiquidity Ratio, and find illiquidity in January to be lower than in any other month. Overall, we find little evidence of elevated risk or illiquidity in January.

Our results from the pre-tax, pre institutions period can be summarized as follows. First, the large January returns for the entire market, for small stocks and for stocks with capital losses mirror CRSP-era evidence, and indicate that the tax loss selling and window dressing explanations are incomplete. Second, stocks with high arbitrage costs—small, volatile, illiquid and capital loss stocks—have the largest January returns. Roll (1983) argues that one reason why the January effect hasn't vanished for small stocks is that small stocks have high transaction costs. Our results both support and generalize Roll's argument. Our evidence also calls into question the interpretation of firm size, volatility and capital losses as pure tax loss or window dressing proxies: if small, volatile and capital loss stocks are hard to arbitrage, they will experience high returns in the face of January buying, above and beyond tax loss selling and window dressing effects. In sum, our results open the door to new explanations for the January effect, to complement tax loss selling and window dressing. We leave identification of these explanations to future work.

2. Prior research and institutional background

We begin with a review of the literature on the January effect. We next provide a brief description of tax regimes in the United States, and end with a description of the evolution of institutional ownership.

2.1 Literature review

A vast literature exists on the anomalous behavior of stock prices at the beginning of the year, starting with Wachtel (1942) and its re-discovery in Rozeff and Kinney (1976). The key findings in this literature are as follows. First, there are high returns both in the month of January (Rozeff and Kinney, 1976) and also in a narrow window that includes the last trading day of the previous year and the first week of the New Year (Roll, 1983). Second, the return is higher for smaller stocks (Keim, 1983; Blume and Stambaugh, 1983). Third, the return is higher for stocks with larger capital losses (Roll, 1983; Reinganum, 1983; Ritter, 1988; Sias and Starks, 1997). The literature has accepted these findings as being consistent with the tax loss selling and window dressing hypotheses.

There are two strands of this literature, yielding spatial as well as longitudinal evidence. Spatially, the presence of a significant January effect in countries with non-December year-ends, such as the UK, suggests that taxes cannot be the whole story (see, among others, Gultekin and Gultekin, 1983). However, such evidence is subject to the criticism that the January effect in these countries is driven by contemporaneous correlations with U.S. returns. More importantly, the near-universal presence of money managers makes it impossible to rule out window dressing as the source of the January effect in these countries.

Given the limitations of international studies, convincing pre-1917 evidence becomes crucial in evaluating the tax loss selling and window dressing hypotheses. As we discuss below in Section 2.2, U.S. income taxes became economically meaningful in October 1917, and the first mutual funds appeared in the 1920s. Thus, an insignificant January effect is expected prior to 1917 if tax loss selling and window dressing are its sole drivers.

A handful of papers examines the January effect prior to 1917, reaching conflicting conclusions. Jones et al. (1987) find significantly elevated January returns in 1871 to 1917 Cowles Index monthly returns; however, Schwert (1990) deems these data econometrically problematic because they are percentage changes in the average of monthly high and low prices. Using data from 1899 to 1917, Schultz (1985) finds no significant increase in the excess return for a portfolio of low price (presumed small) stocks relative to the Dow Jones Index (comprising large stocks) around the turn-of-the-year. Jones et al. (1991) likewise find no increase in the return for a reconstituted equal-weighted portfolio of Cowles Index stocks relative to the Dow Jones return at the turn-of-the-year over the same period as Schultz.

The absence of a January effect prior to 1917 thus became a stylized fact. Yet, incongruities remain. Goetzmann et al. (2001) report a higher mean monthly index return in January than in other months from 1815 to 1925, but examine neither pre-1917 data alone, nor large versus small stock return differences. Moreover, they use monthly returns, whereas the other two studies use a specific nine-day event window to measure the turn-of-the-year return. Adding to the difficulty in comparability, Goetzmann et al. use total returns, whereas Schultz (1985), Jones et al. (1987) and Jones et al. (1991) ignore dividends and splits when compiling returns. Finally, apart from firm size, little evidence exists on cross-sectional variation in the January seasonal when tax and window dressing pressures are not present. We fill this important gap in the literature using data from such an era.

2.2 Capital gains taxes and capital loss offsets

The tax-loss selling explanation requires that income taxes exist and that capital losses be tax deductible. The *Sixteenth Amendment to the United States Constitution,* passed in 1913, introduced U.S. federal taxes at a flat rate of 1% on individual earned and investment income, augmented by surcharges of 1% and 7% on income over $20,000 and $2 million, respectively. Thus, the top marginal rate was 9% on income over $2 million. The *War Revenue Act of 1917*, effective October 1917, boosted the highest marginal rate to 67%. Also effective October 1917, capital losses could be used to offset capital gains. Consequently, prior to October 1917, tax rates were low and capital losses not useful in lowering taxable income, and we follow Schultz in using the *War Revenue Act of 1917* as the advent of tax-loss selling.

Federal income taxes appeared briefly during and shortly after the Civil War. Congress instituted a flat 3% tax on income over $800 in 1861, substituted tax rates of 3% on income between $600 and $10,000 and 5% on income above $10,000 in 1862, increased the top rate to 10% in 1864, and eliminated the tax in 1873. Taxable income was defined as "annual gains, profits and income" including annual capital gains, realized or not (Emerson, 1867, p. 17), and with capital losses deductible only upon realization (Emerson 1867, p.

260).[5] Thus, tax-loss selling may have occurred between 1861 and 1873, and we circumvent its potential effects by starting our analysis in 1874.[6]

State income taxes were negligible throughout these years.[7] Some states imposed temporary income taxes during the Civil War, terminating these shortly thereafter. A handful of southern states retained income taxes through the reconstruction years of the 1860s and 1870s. Wisconsin introduced the first permanent state income tax in 1911, followed by Delaware in 1917 and New York in 1919. Other states relied solely on sales taxes, e.g. New Jersey until 1976 and Connecticut until 1992. State taxes, where present, should not have affected investors in NYSE stocks before 1917, as relatively few NYSE shareholders likely resided in Wisconsin or the Deep South.[8]

In summary, taxes were essentially absent from 1874 to 1913 and tax losses were not deductible until 1917. Tax loss selling should, therefore, not have been practiced from 1874 to 1917.

2.3 *Institutional investors*

The handful of closed-end funds established prior to World War I are unlikely to have affected stock returns significantly. Boston Personal Property Trust, set up in 1893, initially

[5] The early Acts defined income broadly, but imprecisely (Hill, 1894), but the 1867 amendments (Hewitt, 1925, pp. 161-2) make this interpretation explicit. The U.S. Supreme Court in Gray v Darlington [82 US, 15 Wall. 63, 1872, at p. 65] affirmed that "the mere fact that a property has advanced in value between its date of acquisition and sale does not authorize the imposition of a tax on the amount of the advance" and deemed unrealized plus realized capital gains to be taxable annual income. Emerson's (1868) New Internal Revenue affirms that the 1867 amendments left this unchanged and reiterated that "Taxpayers frequently claim deductions for losses from depreciation in the value of stocks or other property of a like nature. No deduction can in any case be allowed for depreciation of value of such property until it is actually disposed of and a loss realized." Thus, accrued capital gains, realized or not, remained taxable with capital losses deductible only upon realization.

[6] The Wilson-Gorman Tariff Act of 1894, struck down by the Supreme Court in 1895, sought to impose a federal tax of 2% on income above $4,000.

[7] On the history of state tax systems, see e.g. Howe and Reeb (1997).

[8] Regional exchanges were larger and served local investors and issuers (O'Sullivan, 2007).

invested only family wealth, but gradually took on general investors. Railway and Light Securities Co. (est. 1904) held only streetcar and public utilities stocks and remained small until the mid-20th century. American International (est. 1915) was a securities firm until the 1920s, when it became an investment company. These closed-end funds were few and small and had negligible equity holdings during our sample period. Closed-end funds making broad equity investments appeared in 1923 and grew in number as the market rose (De Long and Shleifer, 1991). Moreover, the reporting of fund portfolio holdings did not become general practice until 1929, and De Long and Shleifer find no funds doing so until 1927.

Open-end funds were a hot new financial product as the 1920s bull market gathered force, with 19 on offer by 1929, but these funds were absent during our sample period.[9] Further, mutual funds were not legally required to provide unit-holders with uniform and detailed year-end portfolio reports prior to the Investment Companies Act of 1940. The upshot is that the 1874-1917 period we study is unlikely to have seen a significant flow of window dressing transactions from open-end or closed-end fund managers.[10]

Federal civil service pensions were initiated with the passage of the Federal Employees Retirement Act of 1920.[11] Previously, government employees obtained pensions rarely, and on a case-by-case basis. The 1920 Act laid out a comprehensive pension system, funding retiree benefits with employee contributions. The first state employee pension was

---

[9] See Bullock (1959, c. 2) for a history of mutual funds.

[10] Voting trusts, a 19th century investment vehicle, took target companies private, and thus resembled today's private equity firms in not holding listed companies.

[11] Pensions for war invalids and veterans date back to colonial times. Benefits were paid from general government revenues, and involved no investments. The Naval Pension, the sole exception, was intermittently allowed to buy shares. The fund lost heavily on its equity portfolio and required a government bailout in 1841, which led to a seizure of its assets. The fund was re-established in 1862, but Congress seized its assets in 1869.

set up by Massachusetts in 1919, funded by fixed-rate annuities. A few cities provided pensions to municipal employees as early as the 1850s, but these were paid out of current taxes; none had pension funds. Federal, state and municipal pension funds invested almost entirely in government bonds or real estate until the 1960s (Mitchell and Hsin, 1999).

The first corporate pension plan was established by American Express in 1875. The benefits were paltry (American Express paid retirees 1.5% of the first $1,200 of average pay over the ten previous years plus 1% of average pay above that amount, with a $30 monthly cap on the total), and the plan was unfunded (if the corporation failed, the benefits ended). Corporate pension funds emerged after 1921, and tax reforms in 1926 made pension fund contributions deductible from corporate income. However, the early corporate pension funds invested in insurance company annuities because shares were widely viewed as imprudently risky. Defined contribution plans were introduced in the 1950s or later. Corporate pension funds became major investors in equities after the Employee Retirement and Income Security Act of 1974 mandated full funding and endorsed equities as a legally prudent investment for pension funds.[12]

In sum, U.S. institutional investors did not trade NYSE stocks until after our 1874–1917 sample period ends. Over our sample period, therefore, trading and price patterns around the turn-of-the-year could not have reflected window dressing on the part of mutual funds, pension funds, or other modern institutional investors.

[12] The first hedge fund and sovereign wealth fund was created in 1949 and 1953, respectively (Anson, 2006, p. 36; Kimmitt, 2008, p. 119).

3. Data

3.1. Stock price, volume and quotes

We hand-collect daily data on share prices and trading volume for all NYSE-listed stocks between January 3, 1865 and December 31, 1925.[13] Our data source is the *New York Times* (NYT). Scanned images of stock quotes from the NYT were obtained from the ProQuest database with supplemental images obtained from microfilm records. Throughout the sample period, trading occurred on the NYSE between Monday and Saturday. Thus, our initial sample represents over 18,000 trading days (data for 11 days were missing in the archives). Outside of Sunday and holiday closures, the NYSE closed on three separate occasions: 1) sporadically, in April 1865, after the assassination of President Lincoln; 2) for eight days during the "Panic of 1873," triggered by the Coinage Act and the collapse of Jay Cooke Co.; and 3) between July 31 and December 12, 1914, at the start of WWI.

The NYT's reporting of stock prices and trading activity evolved with the structure and trading conventions of the NYSE. From 1865 to 1882, the NYT reported all trades at the transaction-level over a series of boards, which represented discrete trading periods through the day. Typically, trading occurred in morning, early afternoon, late afternoon and, occasionally, early evening sessions.

Between 1874 and 1882, we aggregate transaction volumes across boards (trading sessions) to the daily frequency and record the price corresponding to the final transaction in the last trading session of the day as the end-of-day price. In 1883, the NYSE switched to

[13] The initial date in our dataset is determined by dividend data availability (discussed below), though price data prior to 1865 are available in the NYT. As discussed previously, for the purposes of this paper, we utilize data from 1874-1917.

continuous trading and the NYT commenced reporting the daily closing price and daily trading volume. In May 1893, the NYT also began to report daily closing bid and ask prices.

To minimize the likelihood of transcription errors, all data items were separately entered by two persons. Inconsistencies between the two digital files were flagged, checked, and corrected manually. To detect row misalignment or typographic errors in the NYT, all returns in excess of 15% that were reversed the following day were also manually inspected.

We apply a series of filters to the data. First, we retain only common shares for each firm. In any month, we exclude low price stocks defined as stocks with a beginning-of-month price below $1, as well as stocks cross-listed in the UK. We exclude very infrequently traded stocks, which we define as stocks that do not trade at least once per month in each calendar year. A concern with this liquidity filter is that it might lead to the exclusion of stocks in the year of their IPO or insolvency, unless these events happen to occur at the beginning or end of the year, respectively. We deal with these cases by examining the years before and after each stock enters or exits the database. IPOs are identified as cases with no prior trading but subsequent active trading. To identify distressed or insolvent firms, we flag stocks with significant drops in price followed by a mid-year halt in trading, and with no trading in the following years. If a firm enters bankruptcy, its final return is set to -100%. In the case of acquisitions, stock prices are retained until the acquisition date.

3.2. Dividends and shares outstanding

We obtain dividend and shares outstanding data from the Commercial and Financial Chronicle (CFC). The CFC was published weekly during our sample period and dividend information for NYSE stocks comes from the Bankers' Gazette section in the publication. The Bankers' Gazette reports the dividend amount and the payment and ex-dividend dates.

Additionally, the CFC separately published an Investors' Supplement, monthly prior to 1870, and quarterly and semi-annually thereafter. The Investors' Supplement provides summary information for virtually all NYSE-listed stocks, including shares outstanding, dividends paid over the prior five to seven years, board of director activity, and corporate actions such as expansions, acquisitions, splits and repurchases.[14]

We collect dividend data for all stocks from the Bankers' Gazette and use the Investors' Supplement summaries to check that no dividends are missed. In the rare event of a discrepancy between the two sources, data from the Investors' Supplement summaries take precedence. One limitation of the summaries is that they list the month of the dividend and not the ex-dividend date. Thus, when the dividend amount is taken from the Investors' Supplement, we use the ex-dividend date from the Bankers' Gazette.

Share structures underwent a significant transformation over our sample period. Prior to 1890, common shares were usually issued with a par value of $100, but par values of $50 or $25 were not uncommon. In the early 1900s, most firms transitioned to shares with no par value, issuing a given number of no par value shares to replace outstanding par value shares. Pre-transition, the convention was to report a firm's dividend as a percentage of the par value of its shares. The date of each firm's transition to no par value is identified so its dollar dividend can be recorded.

[14] Five stocks with price data were not found in the Investors' Supplement summaries, and were excluded from the analysis.

4. Results

This section presents returns at the market level and for characteristic-based portfolios of stocks. We also analyze trading activity.

4.1 The January effect, 1874 – 1917: Initial evidence

4.1.1 Market returns

First, we provide evidence on the January return at the market level. We follow the literature in reporting the results for equal-weighted returns and include value-weighted returns for comparative purposes. *Table 1 Panel A* presents summary statistics for returns in January and the rest of the year over several periods. Our focus is the pre-tax period, which extends from January 1874 through October 1917. However, the first row reports statistics for the post-tax period, November 1917 through December 2020. The mean post-tax equal-weighted January return is 4.5%, which dwarfs the 0.8% return in other months.[15] The 3.7% difference between the mean returns for January and other months is statistically significant. The corresponding mean value-weighted return for January is much lower (1.3%), is not statistically different from the mean return of 0.9% for other months, and underscores the role played by small firms in generating the January seasonal. The time–series mean of the monthly median return is 2.7% in January (versus 0% in other months), suggesting that extreme returns do not drive the January effect.

The second row in *Table 1 Panel A* reports the corresponding returns for the full pre-tax period, January 1874–October 1917. The mean equal-weighted January return over this period is 3.1%, and is significantly above the mean return of 0.8% for other months. The

[15] The return is similar to the 3.91% equal-weighted return for January documented in Rozeff and Kinney (1976).

mean value-weighted returns for January and the rest of the year are, as in the post-tax era, smaller, at 1.2% and 0.3%, and the difference is not statistically significant. The remaining rows in Panel A show that market performance is stronger in January in every decade in our sample period. Thus, mirroring the post-tax evidence, the January effect is both large and persistent in the pre-tax period.

Figure 1 Panel A shows the mean difference between equal-weighted and value-weighted returns for each calendar month. This difference reflects the relative performance of small stocks across the year. The remaining panels, discussed below, provide matching results for sorts. The January spike dominates *Panel A*, while the difference is smaller in the remaining months. The relative small stock outperformance occurs primarily in January, and is consistent with Keim (1983), who studies the post-tax era and interprets the evidence in favor of the tax-loss hypothesis. Our evidence comes from a sample period that precedes taxes and hence requires a different explanation.

The pre-tax results in our study differ from the insignificant January effect in Schultz (1985) and Jones et al. (1991). Both Schultz and Jones et al. report excess returns relative to the Dow Jones index for the period 1900–1917, the former using a low price stock portfolio and the latter using disaggregated Cowles Index returns. Nevertheless, we explore reasons why our results might differ from theirs. As shown the last row of *Panel A*, the mean January return is lower in the 1910-1917 subperiod than in other subperiods (as is the differential between the mean returns for January and the remaining months). The low returns in the 1910-1917 period exert greater weight in the Schultz and Jones et al. studies, but have less of an influence in our longer sample period.

We interpret these results as follows. The 4.5% turn-of-the-year return for the post-tax period is consistent with the tax-loss selling and window-dressing explanations. However, the smaller but nonetheless statistically significant and economically important 3.1% return for 1874–1917 precedes the imposition of taxes and the arrival of fund managers, and so cannot be due to either. The persistence of the January effect across the pre-tax and post-tax eras suggests that it is costly to trade on this strategy. Our sort results, discussed below, yield informative new evidence consistent with this premise.

4.1.2 Sort results: Size and Capital Losses

We know from prior analyses of the post-tax era that January returns are higher for small stocks and stocks with tax losses.[16] These findings have been taken as favoring tax loss selling and window dressing. The premise is that small stocks are more likely to have volatile returns and generate large capital losses (and gains), with the losses leading to tax loss- or window dressing- motivated selling in December, and high January returns reflecting the bounce-back in their prices. In our sample period, which predates the imposition of taxes or the presence of institutional investors, we do not expect a significant January effect for small or loser stocks. If such an effect is found, alternative explanations must be sought.

We form quintiles based on each variable at the end of month *t*-2 and compute the month *t* equal–weighted portfolio returns. As in Jegadeesh and Titman (1993), we skip a month to avoid transitory return effects. Using the monthly portfolio returns for January 1874 through October 1917, we compute the mean risk-adjusted returns for each portfolio

[16] See, among others, Branch (1982), Keim (1983), Roll (1983), and Reinganum (1983).

for January and the rest of the year (months combined) via the following time-series regression:

$$R_{p,t} - r_{f,t} = \alpha_p + \beta_p(R_{p,t} - r_{f,t}) + \epsilon_{p,t} \quad (1)$$

where α_p is the risk-adjusted return (*alpha*) for portfolio p and β_p is the portfolio beta. We also calculate the difference between the alphas for January and the rest of the year for each portfolio, and the difference between the alphas for the top and bottom quintiles.[17]

Table 1 Panel B contains the results, with values significant at the 5% level shown in boldface. Size is measured as the end-of-month *t*-2 market value of equity. It is well–documented that small firms earn higher average returns than larger firms (e.g. Banz, 1981), and this pattern is evident in non-January months, but especially in January. The January alpha is 5.2% for small (Q1) firms compared to -0.1% for large (Q5) firms, and the difference is statistically significant at the 5% level. Across other months, small firms earn an alpha that is 1.3% higher than the alpha for large firms. Netting out the alphas for other months leads to a *5m1* January premium of –3.9%, significant at the 5% level. Keim (1983) documents that a substantial portion of the annual size premium in the post-tax era is earned in January. Our results show a large size premium for January versus other months in a period with non-existent tax loss- and window dressing- driven selling.[18]

The second section of *Panel B* reports the Capital Gains sort, with capital gains measured as the proportional price change over the 12 months ending in month *t*-2. In the

[17] We use the CAPM as the benchmark model with the excess value-weighted market return as the market proxy. We calculate the monthly market return using our stock data and use a time series of risk-free rates available from the NBER. Schwert (1989) describes the interest rate series and adjustments.

[18] The estimated betas show the expected cross-sectional patterns. The portfolio betas are higher for smaller, more volatile and less liquid stocks and for stocks with capital losses. Since betas are not our focus, we do not tabulate them in the interest of brevity.

post-tax literature, the capital gains evidence has been interpreted as supporting the tax loss-selling hypothesis: stocks with capital losses generate the highest January returns because these stocks are heavily sold in December and their prices rebound in January. In the pre-tax era, we expect the January return to be unrelated to the size of capital losses. Instead, we find that quintile 1, comprising stocks with the largest trailing capital losses, has the highest January alpha. The alpha for Q1 is 4.9%, versus –0.5% for Q5, and the *5m1* January alpha of -5.4% is statistically significant. The *5m1* monthly alpha for the rest of the year is -0.1%, and results in a significant *5m1* January premium of -5.3%. This January premium for loser stocks cannot be attributed to tax loss-selling or window dressing, so, once again, we are left to conclude that other factors must be at play.

Panel B and *Panel C* of *Figure 1* show the *5m1* size and capital gains alphas for each calendar month, estimated by regressing the difference between the excess returns for portfolio 5 and portfolio 1 on the excess market return by month. For both sorts, the difference between the alphas peaks in January and is relatively small in the remaining months. Thus, stocks that are small and have capital losses earn high returns in January relative to stocks that are big and have capital gains, while the patterns in the remaining months are weaker. As in the post-tax period, January is an unusual month for small and capital loss stocks.

4.1.3 Trading activity

Analysis of trading activity helps us understand the origins of the January effect. On the one hand, heavy trading would suggest that high January returns are the outcome of active investment decisions. By contrast, light trading would be more supportive of a risk-based explanation, i.e. the idea that investors stay out of the market in January because of elevated

January risk. To proceed, we calculate monthly share turnover (volume scaled by the previous month's shares outstanding) for each stock and then aggregate it for the market and the size and capital gains portfolios. The sample period is January 1874 – October 1917.

Table 2 presents the mean equal-weighted monthly turnover for the market for January and for the remaining eleven months combined. Mean turnover for January is 23.1% vs. 19.4% for the other months in the year and the difference is significant (p-value = 0.02). The higher marketwide trading activity in January is consistent with the January return being the outcome of investor allocations to stocks at the beginning of the year, rather than due to risks that make investors more cautious. As a more detailed look, *Figure 2* plots the mean equal-weighted and value-weighted turnover over the entire sample period by calendar month. Mean January equal- and value-weighted turnover exceed the mean equal- and value-weighted turnover for 10 of the remaining 11 months. By no means is January a period of low trading vis-à-vis other months.

Table 2 also presents equal-weighted monthly turnover for the size and capital gains quintiles for January versus the rest of the year. In non–January months, turnover increases (though not smoothly) with firm size, from 12% for the smallest quintile to 30% for the largest quintile. The January versus the rest of the year turnover differential is positive in every quintile. In proportional terms, the largest increase in January turnover occurs for the smallest stocks. These results indicate that the high January return for small stocks is not associated with thin trading; instead, small stocks appear to attract the maximum incremental trading interest in January relative to other months.

Turnover increases in January in every capital gains quintile except for Q2, with stocks in Q1 (with the largest capital losses) and Q4 experiencing statistically significant increases in turnover in January (both quintiles experience a 40% increase in turnover in January). In the post-tax era, the increase in turnover for Q1 stocks can be explained by investors buying stocks with capital losses that are heavily sold in December. There is no such trading motive in the pre-tax period to explain the increase in January turnover.

4.2 Is it risk or illiquidity?

In estimating a portfolio's alpha, we control for the beta of the portfolio (measuring its systematic risk) and allow this risk to vary between January and other months. However, unobserved risks beyond systematic risk might exhibit a seasonal pattern. In this section, we investigate the possibility that high January returns represent compensation for elevated risk or illiquidity in January. We examine two risk proxies and compare their magnitudes in January and the rest of the year.

We start by examining whether stock market volatility is high in January. The presumption is that the effects of unobserved risks will be reflected in contemporaneous market volatility. Our procedure follows Schwert (1989). We first calculate realized monthly market volatility as the sum of squared daily equal-weighted (EW) or value-weighted (VW) returns in the month. We then regress monthly volatility on 12 lags of monthly volatility and on month dummies. The coefficients on the month dummies represent the mean volatility in each calendar month, controlling for the persistence in volatility.[19]

Panel A and *Panel B* of *Figure 3* show the mean market volatility in each calendar month. For convenience, we order months from low to high in terms of volatility. We see that

[19] The sum of the coefficients on lagged volatility show that volatility is highly persistent, consistent with Schwert's estimates that cover much of this period. If we ignore this persistence and simply calculate the mean volatility by calendar month, we obtain a similar pattern, with higher point estimates.

the January estimates (EW = 2.3%, VW = 1.3%) are not among the highest values. Mean EW volatility is higher in May and December, while mean VW volatility is higher in nine other months, relative to January. A formal test (not shown in the interest of brevity) does not reject the null hypothesis that mean EW or VW volatility is no different in January than the other eleven months. Thus, to the extent that return volatility is positively correlated with macroeconomic risk, these results do not support the existence of elevated risk in January.

We also examine whether macroeconomic volatility is higher in January. We obtain a monthly series of industrial production growth (IPG), which commences in January 1884. To estimate monthly IPG volatility, we again follow Schwert (1989). We first regress IPG on 12 lags of IPG and month dummies. The absolute value of the residual from this equation, an estimator of monthly volatility, is regressed on 12 lags of absolute residuals and on month dummies. *Panel C* of *Figure 3* shows the coefficients on the month dummies. IPG volatility is second lowest in January, at 2.8%, behind only September, and is visibly smaller than the estimates in other months. It doesn't appear that January is associated with high macroeconomic volatility.

Finally, we examine whether illiquidity is higher in January. We calculate the Amihud Illiquidity Ratio for each stock and month as the mean value of the daily absolute stock return divided by daily dollar volume for the stock in the month, and then compute the equal- and value- weighted averages across stocks for the month. Finally, we calculate the mean illiquidity ratio for each calendar month. The mean illiquidity in January is 1.96 (x10^{-5}), below the average of 2.89 (x10^{-5}) in February-December, although this difference is not statistically significant. *Figure 4* charts the mean value of illiquidity by calendar month over our sample period and shows that January illiquidity is the lowest of all months.

This analysis suggests that neither volatility nor illiquidity is unusually high in January. The high January returns at the market level or for small or loser stocks do not appear to be compensation for holding stocks over a period of enhanced risk or lower liquidity.

4.3. Arbitrage costs

The results thus far indicate that January returns are high, while risk and illiquidity are not, relative to other months. Roll (1983) suggests that a persistent January effect is at odds with efficient markets, unless it can be explained by high transaction costs. Shleifer and Vishny (1997) provide a theoretical explanation for the prevalence of anomalies based on limits to arbitrage. In this section, we examine the link between arbitrage costs and high January returns over our sample period. We use volatility and illiquidity as proxies for arbitrage costs under the premise that volatility impairs the effectiveness of arbitrage strategies, and illiquidity directly increases their cost.

We begin by analyzing how arbitrage costs vary with firm size and capital gains status. For each stock and in each month, we calculate the standard deviation of daily returns and the mean daily Amihud Illiquidity Ratio. We average the standard deviation and illiquidity in each size and capital gains quintile. As before, we sort stocks into quintiles based on market value and 12-month price appreciation at the end of month *t-2* and examine average volatility and illiquidity in month *t*. *Table 3* presents the time-series average of the monthly mean volatility and illiquidity values for each quintile.[20]

[20] Table 3 also presents the mean value of each sorting variable in the quintiles. The smallest stocks in Q1 have a mean MV of $1.5 million in unadjusted dollars, while the largest stocks in Q5 have a mean MV of $97.2 million. In the capital gains sort, Q1 stocks have a mean capital gain of –33% (i.e. lose one-third of their value), while the remaining quintiles have, on average, positive capital gains, with Q5 experiencing a mean gain of 79%.

We start with the size sort. The smallest stocks in Q1 have the highest volatility (3.8% per month) and illiquidity ($112 \text{x} 10^{-6}$). By contrast, Q5 stocks have a mean volatility of 1.0% and a mean illiquidity of $0.55 \text{x} 10^{-6}$. Thus, small stocks are roughly four times more volatile and 200 times more illiquid than big stocks. Sorting on capital gains, we see that monthly volatility for stocks in Q1, with the largest 12-month capital loss, is 3.3% compared with 2.1% for Q5 stocks. Illiquidity ranges from $83 \text{x} 10^{-6}$ for Q1 stocks to $19 \text{x} 10^{-6}$ for Q5 stocks. In other words, stocks with the largest capital losses are significantly more volatile and less liquid than stocks with capital gains.

Table 3 shows that small stocks and stocks with capital losses, which earn the highest January returns in the pre-tax era, have the highest arbitrage costs, as measured by volatility and illiquidity. This raises the possibility that arbitrage costs contribute to the January effect. We directly evaluate the importance of arbitrage costs by conducting sorts on volatility and illiquidity. If arbitrage costs influence the size of the January return, we should see high January returns for the most volatile and illiquid stocks.[21]

Table 4 provides the results. *Panel A* shows the alphas for the volatility quintiles. Stocks are assigned to volatility quintiles at the end of month *t*-2, based on the standard deviation of daily returns between month *t*-13 and *t*-2, and portfolio returns are calculated in month *t*. Alphas are then calculated as in equation (1) above.

The January alpha is largest for the highest volatility portfolio (Q5), at 4.9%, versus 0.2% for the lowest volatility (Q1) stocks, and the *5m1* premium of 4.7% is significant. The

[21] Table 3 reports mean volatility and illiquidity for the volatility and illiquidity quintiles. The 5m1 spread in the sorting values of volatility and illiquidity is large. Additionally, illiquidity increases as we move to higher volatility portfolios, and volatility increases as we move from liquid to illiquid portfolios. Thus, the two arbitrage cost proxies align well across the portfolios.

5m1 premium in other months is also positive and significant, but shrinks to 1.1%. The 3.6% difference between *5m1* for January and the remaining months is significant at the 5% level. High volatility stocks earn a significant risk-adjusted return relative to low volatility stocks, particularly in January.[22]

The adjacent columns in *Panel A* report the ILLIQ sort results. As with volatility, stocks are assigned to ILLIQ quintiles at the end of month *t*-2, based on the mean Amihud Illiquidity Ratio between month *t*-13 and *t*-2, and portfolio returns are calculated in month *t*. The January alphas for Q5 stocks (the most illiquid stocks) and Q1 stocks (the most liquid stocks) are 5.1% and 0.0%, resulting in a statistically significant *5m1* January illiquidity premium of 5.1%. Consistent with illiquid stocks providing higher returns, the premium for illiquidity is evident in other months, too, at 1.4%, significant at the 10% level. These numbers yield an excess *5m1* January illiquidity premium of 3.8%, significant at the 5% level. As was the case for size, there is an extra premium on illiquid stocks in January.

The return results in *Panel A* show that the most volatile and illiquid stocks—with the highest arbitrage costs—have the largest risk-adjusted returns in January. By contrast, the least volatile stocks and the most liquid stocks have insignificant January returns. The results, therefore, are consistent with the January effect being driven by stocks with high arbitrage costs.

For completeness, *Panel B* presents trading activity for the volatility and illiquidity portfolios. Share turnover for each volatility portfolio increases in January relative to the

[22] The positive volatility premium is at odds with work showing a negative relation between volatility and returns (e.g. Ang et al. 2006), but this evidence comes from the CRSP (i.e. post-tax) era. Extending our sample to the CRSP period, we find a negative relation between volatility and returns in non-January months but that the positive January association survives. While intriguing and worthy of further research, this is beyond the scope of the current paper.

remaining months, though the only significant increase is for Q4. Likewise, turnover is higher in January than in the remaining months for each illiquidity portfolio, and the increase is significant for Q1 and Q3. The most illiquid stocks (Q5) experience a proportional increase in turnover of 24%, which is economically material. Overall, it doesn't appear that volatile or illiquid stocks are shunned by investors in January. Instead, January is a period of active trading for these stocks.

5. Discussion and interpretation

Our analysis of 1874-1917 data yields the following key evidence. Market returns are highest in January, and within January, returns are highest for the smallest stocks and for stocks with trailing capital losses. These results are similar to the results based on CRSP data, but come from a period when taxes and institutional investors were absent. Tax loss selling and institutional window dressing, favored explanations from the CRSP period, cannot explain the January returns in the pre-tax era, nor can they explain the importance of size and capital losses in explaining cross-sectional differences in the magnitude of the January return.

Something else is going on. What could be driving the January effect during our sample period? It is well accepted that small stocks have high transactions (more generally, arbitrage) costs. Examining two proxies for arbitrage costs—volatility and illiquidity—we find that the smallest stocks and stocks with the largest capital losses have the highest arbitrage costs. We assign stocks to portfolios based on the two arbitrage cost proxies and find that the portfolios with the highest arbitrage costs (i.e. comprising the most volatile and least liquid stocks) have the highest January returns. We also find evidence that marketwide trading activity picks up in January and that the increase in trading activity is large for small stocks, stocks with capital losses, volatile stocks and illiquid stocks.

The robust trading activity and positive returns are consistent with purposeful investor buying of small, capital loss, volatile and illiquid stocks in January. In the face of broad-based buying pressure, it stands to reason that stocks with high arbitrage costs should rise the most in price. We leave the question of exactly why investors tend to be net buyers of stocks in the month of January to future research.

Overall, our results appear most consistent with a costly arbitrage explanation for high January returns. The pre-tax, pre institutions sample period we study allows us to isolate this effect in the absence of the dominant tax-loss selling and window dressing influences.

6. Concluding comments

We study the January effect in an extensive, new dataset of stock-level returns between 1874 and 1917, a period that is free of taxes and modern institutional investors. We find a statistically significant and economically large 3.1% January market return over this period. The January return is significantly higher than the 0.8% average return in other months and cannot be due to tax-loss selling or institutional investor window-dressing. We also document elevated risk-adjusted January returns for small stocks, stocks with capital losses, volatile stocks and illiquid stocks—all associated with high arbitrage costs. January trading activity is high for the entire market and for stocks with the highest returns. Market and macroeconomic volatility and illiquidity are not elevated in January.

The latter finding is at odds with risk- or illiquidity- based explanations for the January effect in our sample period. The high returns and elevated trading we uncover present a challenge to tax loss selling and window dressing as the sole drivers of the turn-of-the-year effect. Other explanations are needed to fully account for the elevated January returns.

References

Ang, A., R. Hodrick, Y. Xing and X. Zhang, The cross-section of volatility and expected returns, *Journal of Finance* 61, 259-299.

Anson, M. J.P. 2006. The Handbook of Alternative Assets. John Wiley & Sons.

Banz, R., 1981. The relationship between return and market value of common stocks, *Journal of Financial Economics* 9, 3-18.

Blume, M. and R. Stambaugh, 1983, Biases In Computed Returns: An Application to the Size Effect, *Journal of Financial Economics* 12, 387-404.

Branch, B., 1977, A Tax-loss Trading Rule, *Journal of Business* 50, 198-207.

Bullock, H., 1959. The Story of Investment Companies. Columbia University Press.

Chang, E. C., and M. J. Pinegar, 1986, Return Seasonality and Tax-Loss Selling in the Market for Long-term Government and Corporate bonds, *Journal of Financial Economics* 17, 391–415.

Constantinides, G., 1984, Optimal stock trading with personal taxes: Implications for prices and the abnormal January returns, *Journal of Financial Economics* 13, 65–89.

Cowles, A., 1938. Cowles Commission for Research in Economics, Principia Press, Bloomington, Indiana.

De Long, J. and A. Shleifer. 1991. The stock market bubble of 1929: evidence from closed-end mutual funds, *Journal of Economic History* 51, 675-700.

Doukas, J., C. Kim and C. Pantzalis, 2010, Arbitrage Risk and Stock Mispricing, *Journal of Financial and Quantitative Analysis* 45, 907-934.

Emerson, C. Noble 1867. Emerson's Internal Revenue Guide. Springfield, Mass.: S. Bowles.

Emerson, C. Noble. 1868. Emerson's New Internal Revenue Guide. Springfield, Mass.: S. Bowles

Goetzmann, W., R. G. Ibbotson and L. Peng, 2001, A New Historical Database for the NYSE 1815 to 1925: Performance and Predictability, *Journal of Financial Markets* 4, 1-32.

Gultekin, M. N. and N. B. Gultekin, 1983, Stock Market Seasonality: International Evidence. *Journal of Financial Economics* 12, 469-481.

Hill, Joseph A. 1894. The Civil War Income Tax. *Quarterly Journal of Economics* 8, 416-452

Howe, E. T. and D. J. Reeb, 1997, The historical evolution of state and local tax systems, *Social Science Quarterl*y 78, 109-121.

Jegadeesh, N. and S. Titman, 1993, Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *Journal of Finance* 48, 65-91.

Jones, C. P., D. K. Pearce and J. W. Wilson, 1987, Can Tax-Loss Selling Explain the January effect? A Note, *Journal of Finance* 42, 453–461.

Jones, S. L., W. Lee and R. Apenbrink, 1991, New Evidence on the January effect Before Personal Income Taxes, *Journal of Finance* 46, 1909–1924.

Jordan, S. and B. Jordan, 1991, Seasonality in Daily Bond Returns, *Journal of Financial and Quantitative Analysis* 26, 269-285.

Keim, D., 1983, Size-Related Anomalies and Stock Return Seasonality: Further Empirical Evidence, *Journal of Financial Economics* 12, 13-32.

Kimmitt, Robert M. 2008. Public footprints in private markets: Sovereign wealth funds and the world economy. *Foreign Affairs* 87, 119-130.

Lakonishok, J. and S. Smidt, 1988, Are Seasonal Anomalies Real? A Ninety-Year Perspective, *Review of Financial Studies* 1, 403-425.

Mitchell, O. and P. Hsin, 1999, Public Pension Governance and Performance. *The Economics of Pensions: Principles, Policies, and International Experience,* New York and Melbourne: Cambridge University Press.

O'Sullivan, Mary, 2007, The Expansion of the U.S. Stock Market, 1885—1930: Historical Facts and Theoretical Fashions, *Enterprise & Society* 8, 489–542.

Reinganum, M. R., 1983. The anomalous stock market behavior of small firms in January: Empirical tests for year-end tax effect, *Journal of Financial Economics* 12, 89-104.

Ritter, J. R., 1988, The buying and selling behavior of individual investors at the turn-of-the-year, *Journal of Finance* 43, 701-719.

Roll, R., 1981, A possible explanation of the small firm effect, *Journal of Finance* 36, 879-888.

Roll, R., 1983, Vas ist das? The turn-of-the-year effect and the return premium of small firms, *Journal of Portfolio Management* 9, 18-28.

Rozeff, M. S. and W. R. Kinney Jr., 1976, Capital market seasonality: The case of stock returns, *Journal of Financial Economics* 3, 379-402.

Schultz, P., 1985, Personal income taxes and the January effect: Small firm stock returns before the War Revenue Act of 1917: A note, *Journal of Finance* 40, 333-343.

Schwert, G. W., 1989, Why Does Stock Market Volatility Change Over Time?, *Journal of Finance* 44, 1115-1153.

Schwert, G. W., 1990, Index of U.S. Stock Prices from 1802 to 1987, *Journal of Business* 63, 399-426.

Sias, R. W. and L. Starks, 1997, Institutions and Individuals at the Turn-of-the-Year, *Journal of Finance* 52, 1543-1562.

Shleifer, A. and R. Vishny, 1997, The Limits of Arbitrage, *Journal of Finance* 52, 35-55

Wachtel, S. B., 1942. Certain observations on seasonal movements in stock prices, *Journal of Business* 15, 184-193.

Table 1
Monthly Returns in the Pre-tax Period

This table reports the monthly NYSE stock return for the pre-tax period Jan 1874-Oct 1917 and the post-tax period Nov 1917-Dec 2020 as well as for sub-periods defined in column 1. Mean equal and value weighted returns are reported with value weights based on market capitalization at the end of the preceding month. The mean return is presented for *January* and for the *Rest of the Year*. The latter covers the 11 months other than January, with the mean computed by year across the 11 months and then averaged across years. Panel B reports the mean alphas for size and capital gains quintiles for January and the other 11 months combined, as well as the difference between January and remaining months and the difference between the top and bottom quintiles. Alphas are computed as the intercept in a time-series regression of the excess portfolio return on the excess value weighted market return: $R_{p,t} - r_{f,t} = \alpha_p + \beta_p(R_{p,t} - r_{f,t}) + \epsilon_{p,t}$. *Size* is market capitalization measured at the end of month *t*-2. *Capital gain* is the proportional price change between month *t*-13 and *t*-2. Boldface indicates significance at the 5% level in the case of the full post-tax and pre-tax sample returns.

Panel A: Monthly returns for the market

	January			Rest of the Year		
Time Period	Mean EW	Mean VW	Median EW	Mean EW	Mean VW	Median EW
Nov-1917 to Dec-2020	**4.5%**	**1.3%**	**2.7%**	**0.8%**	**0.9%**	0.0%
Jan-1874 to Oct-1917	**3.1%**	**1.2%**	**1.3%**	**0.8%**	0.3%	0.2%
1874-1879	5.0%	2.8%	2.7%	1.2%	0.3%	0.4%
1880-1889	1.7%	0.7%	0.8%	0.4%	0.2%	0.1%
1890-1899	4.2%	2.6%	2.8%	0.4%	0.2%	0.0%
1900-1909	3.7%	0.5%	0.2%	1.4%	0.8%	0.5%
1910-1917	1.4%	-0.4%	0.4%	0.5%	0.1%	-0.1%

Panel B: Monthly alphas for stocks sorted by size and capital gains

	Size						Capital Gains					
	Q1	Q2	Q3	Q4	Q5	Q5 - Q1	Q1	Q2	Q3	Q4	Q5	Q5 - Q1
January	**0.052**	0.010	0.005	0.001	-0.001	**-0.052**	**0.049**	**0.015**	0.009	0.001	-0.005	**-0.054**
Feb-Dec	**0.013**	**0.004**	0.002	0.001	0.000	**-0.013**	**0.008**	0.002	0.001	0.001	**0.007**	-0.001
Difference	**0.039**	0.006	0.002	0.000	0.000	**-0.039**	**0.041**	**0.013**	0.008	0.000	-0.012	**-0.053**

Table 2
Mean Monthly Turnover

This table reports mean equal weighted monthly turnover (monthly volume scaled by shares outstanding) for January and the average of the other months in the year for the market and for size and capital gain quintiles. Boldface indicates differences that are significant at the 5% level. *Size* is market capitalization measured at the end of month *t*-2. *Capital gain* is the proportional price change between month *t*-13 and *t*-2. The sample period is January 1874 through October 1917.

	Market	Size					Capital Gain				
		Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
January	0.231	0.163	0.15	0.251	0.245	0.339	0.222	0.167	0.226	0.306	0.255
Feb-Dec	0.194	0.115	0.122	0.194	0.237	0.299	0.158	0.173	0.194	0.219	0.243
Difference	**0.038**	**0.048**	0.028	**0.057**	0.008	0.04	**0.064**	-0.006	0.032	**0.087**	0.012

Table 3
Arbitrage costs

This table reports summary statistics for the stocks included in the pre-tax sample. For each sort, the first row provides the mean value of the sort variable over the sort period. The next two rows show average volatility and illiquidity over the subsequent month. Volatility is measured as the standard deviation of daily returns within the month. Illiquidity is measured as the mean value of the daily Amihud Illiquidity Ratio (AIR) over the month. Volatility (the mean AIR) is first measured in each month using daily returns (the ratio of the daily absolute return to daily dollar trading volume) for each stock, and the values are averaged within each quintile. For readability, the values of AIR are multiplied by 10^6. Quintile 1 (Quintile 5) contains the smallest (largest) stocks, stocks with the lowest (highest) capital gains, stocks with the lowest (highest) return volatility; and stocks with the lowest (highest) AIR. In the sorts, *Size* is market capitalization at the end of month *t*-2; *Capital gain* is the proportional price change between month *t*-13 and *t*-2; *Volatility* is the standard deviation of daily stock returns between month *t*-13 and *t*-2; and *AIR* is the mean daily value between month *t*-13 and *t*-2. The sample period is January 1874 through October 1917.

	Q1	**Q2**	**Q3**	**Q4**	**Q5**
Panel A: Size					
Size, sort period, $m	1.5	4.6	10.5	26.0	97.2
Volatility (%), post sort	3.8	2.4	1.9	1.4	1.0
Amihud Illiquidity, post sort	112	18	5.8	2.1	0.55
Panel B: Capital Gains					
Capital Gain, sort period	-0.33	-0.10	0.02	0.17	0.79
Volatility (%),post sort	3.3	1.9	1.5	1.6	2.1
Amihud Illiquidity, post sort	82.9	18.4	8.5	7.9	18.9
Panel C: Volatility					
Volatility (%), sort period	0.8	1.3	2.0	2.7	5.8
Volatility, post sort	0.8	1.2	1.8	2.5	4.0
Amihud Illiquidity, post sort	2.1	2.2	5.4	17.0	112.0
Panel D: Illiquidity					
Amihud Illiquidity, sort period	0.1	0.7	2.4	8.4	94.8
Volatility, post sort	1.3	1.5	1.6	2.1	3.7
Amihud Illiquidity, post sort	0.1	1.2	3.3	13.1	123.0

Table 4
Monthly Alphas and Turnover for Volatility and Illiquidity Portfolios, 1874-1917

This table reports the monthly alphas (*Panel A*) and turnover (*Panel B*) for January and Feb-Dec for *Volatility* and *Illiquidity* portfolios. Firms are sorted into quintiles on the basis of each sorting variable at the end of month *t*-2 and Equal-weighted returns and turnover are computed for each quintile for month *t*. The portfolio alphas are computed for January and the other months combined via a time-series regression of portfolio return on the excess value weighted market return. *Volatility* is the standard deviation of daily stock returns between month *t*-13 and *t*-2. *Illiquidity* is the mean daily Amihud Illiquidity ratio between month *t*-13 and *t*-2. The differences between the alpha and mean turnover for *January* and *Feb-Dec* and for the top and bottom quintiles are also reported. Boldface denotes significance at the 5% level.

Panel A: Monthly returns

	Volatility						Illiquidity					
	Q1	Q2	Q3	Q4	Q5	Q5 - Q1	Q1	Q2	Q3	Q4	Q5	Q5 - Q1
January	0.002	0.001	0.007	0.010	**0.049**	**0.047**	0.000	0.005	-0.003	**0.016**	**0.051**	**0.051**
Feb-Dec	0.001	**0.002**	0.002	0.003	**0.012**	**0.011**	0.000	0.001	0.002	0.003	0.014	**0.014**
Difference	0.001	-0.001	0.008	0.018	**0.037**	**0.036**	0.000	0.004	-0.004	**0.012**	**0.038**	**0.038**

Panel B: Monthly turnover

	Volatility						Illiquidity					
	Q1	Q2	Q3	Q4	Q5	Q5 - Q1	Q1	Q2	Q3	Q4	Q5	Q5 - Q1
January	0.106	0.293	0.287	0.279	0.181	0.075	0.658	0.179	0.156	0.092	0.079	-0.579
Feb-Dec	0.0855	0.259	0.261	0.232	0.142	0.057	0.577	0.171	0.103	0.078	0.063	-0.514
Difference	0.0205	0.034	0.026	**0.047**	0.039	0.019	**0.081**	0.008	**0.053**	0.014	0.016	-0.065

Figure 1
Calendar month returns for long-short portfolios

The figure shows the mean returns for each calendar month for long-short portfolios. In Panel A, the portfolio is long the equal-weighted market and short the value-weighted market. Panel B, C, D and E plot the calendar month alphas for long-short portfolios based on size, capital gains, volatility and illiquidity sorts. The size and capital gains portfolios go long Q1 and short Q5. The volatility and illiquidity portfolios go long Q5 and short Q1. The quintile returns are equal-weighted. The portfolio's alpha is calculated for every calendar month via a regression of the portfolio excess return for the calendar month on the corresponding excess value-weighted market return.

Figure 2

Monthly Turnover: 1874-1917

The figure reports the equal- and value-weighted share turnover by calendar month. Monthly share turnover is calculated for each stock as monthly volume scaled by shares outstanding, and the equal- and value-weighted averages are calculated across stocks for each month. The figure shows the time-series mean for each calendar month. The sample period is January 1874 through October 1917.

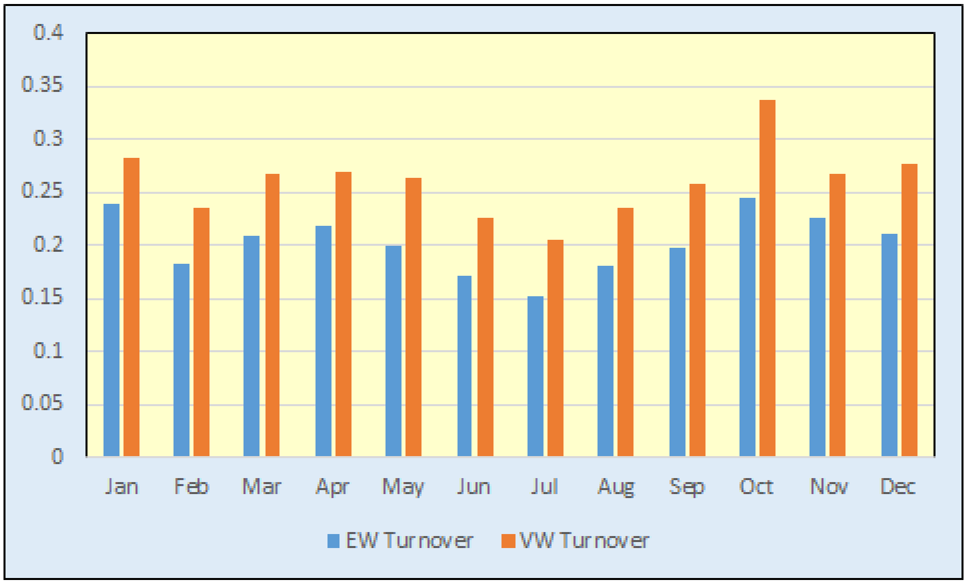
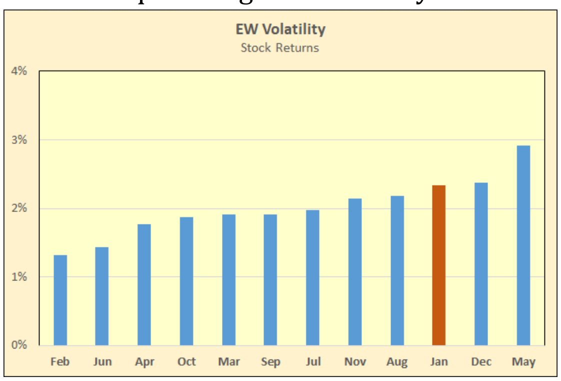


Figure 3

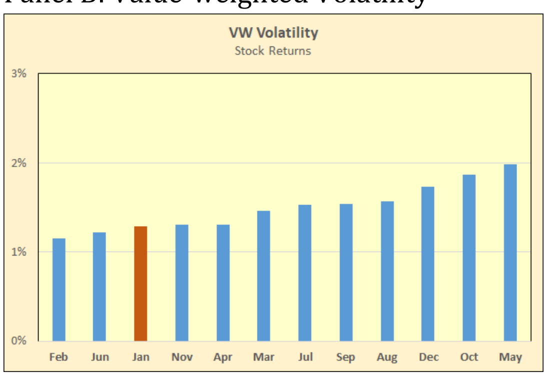
Pre-tax Volatility by Calendar Month

Panel A and Panel B show calendar month stock market volatility, computed as in Schwert (1989). Market volatility for each month is calculated as the square root of the sum of squared daily equal- or value- weighted market returns in the month. Monthly volatility is regressed on 12 lags of monthly volatility and calendar month dummies. Panel A and Panel B plot the coefficients on the month dummies. The sample period is January 1874 through October 1917. Panel C shows the calendar month volatility of industrial production. As in Schwert (1989), we first regress Industrial Production Growth (IPG) on 12 lags of IPG and calendar month dummies. The absolute value of the residual from this model is regressed on 12 lags of absolute residuals and calendar month dummies. The figure shows the coefficients on the month dummies. The sample period is January 1884-October 1917.

Panel A: Equal-weighted Volatility



Panel B: Value-weighted Volatility



Panel C: Volatility of industrial producion

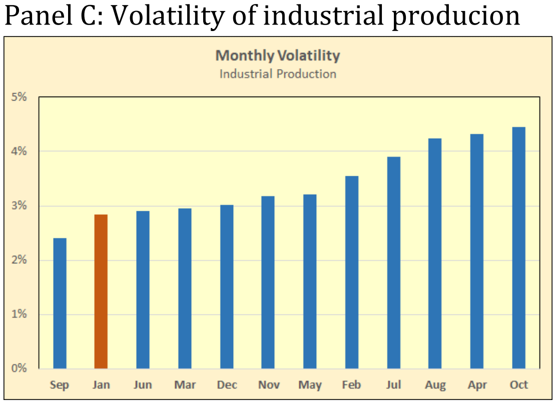


Figure 4

Monthly Amihud Illiquidity Ratio: 1874-1917

The figure shows the equal- and value-weighted Amihud Illiquidity ratio (AIR) by calendar month. For each stock, the daily AIR is calculated as the ratio of the day's absolute return to the dollar trading volume, and the daily values are averaged for each month. The equal- and value- weighted averages are then computed across stocks for each month. The figure shows the mean equal- and value-weighted AIR for each calendar month. The sample period is January 1874 through October 1917.