The Shrinking Stock Market

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Abstract: The total number of publicly traded firms in the US has fallen by roughly a third since the late 1990s such that the size of the market is roughly the same as it was in 1991 despite the overall economy tripling in size since that time. This long-term shrinking stock market trend is associated with higher levels of cash dividend payouts by firms, slower rates of profit and revenue growth, and less firm level risk, all of which point to an average firm which is later in its lifecycle. The loss of firms has a more substantial impact on revenue and profit growth rates for the marginal firm in the market than the addition of new firms does. These results have important implications for the broader economy and are supportive of past literature that smaller firms are being bought out by larger firms rather than going public.

Keywords: Capital Markets, Corporate Finance, IPOs, Delisting

I. Introduction

The US stock markets have shrunk in size by more than a third since the year 2000. As a result, the number of publicly traded companies on the US exchanges is now roughly equal to the level last seen in 1990. This shrinking stock market comes despite an economy that has nearly tripled in size during that period.[1] The shrinking size of the stock market by number of public firms is also in stark contrast to the increasing total market capitalization of the overall stock market.[2] The decline in the number of firms is not solely a byproduct of the bursting of the 2000 dotcom bubble, nor the 2008 recession as Figure 1 below shows.[3] Instead, the decline has been measured and persistent for more than a decade beginning in the late 1990's. The shrinking number of firms, but rising total equity value has resulted in growth in the mean firm's size. And this in turn has real consequences for the mean firm's economic performance consistent with the seminal work of Williamson (1967) and Evans (1987). These studies suggest that as the average firm increases in size, firm growth rates should fall as smaller firm size is robustly linked to greater efficiency and faster growth versus otherwise comparable large firms. These studies are also consistent with the positive premium associated with small firms under modern asset pricing factor models.

[INSERT FIGURE 1]

A smaller stock market by number of firms should be of concern to economists for two reasons. First, if fewer firms have access to financing via equity markets, it may impact overall economic growth. This issue is especially relevant to smaller firms which are faster growing

[1] US GDP of ~$6 trillion in 1990 and ~$16.8 trillion in 2013

[2] US total stock market capitalization was $18.67 trillion in 2013 and$2.8 trillion in 1990 according to the World Bank data available at: http://data.worldbank.org/indicator/CM.MKT.LCAP.CD?page=1

[3] This figures excludes closed end funds (CEFs) and ETFs which have increased markedly in number in the last decade. Investment vehicles such as REITs, CEFs, and ETFs are excluded from all firm counts through this study. All results are robust to the exclusion of financial firms, though those companies are left in for completeness sake.

under standard models of firm life cycles such as those tested by Evans (1987). Second, a stock market that is smaller by number of firms may be less representative of the overall economy which in turn undermines the investors ability to achieve maximum diversification by investing in the broadest possible array of assets.

While past research has not previously explored the issue of concentration of a stock market and real economic variables for firms in the market, past work has examined how access to equity financing impacts firm growth. Beck, Demirgüç-Kunt, and Maksimovic (2005) show that smaller firms are more dependent on access to easy financing to finance growth than large firms are. This suggests that if small firms have less access to equity markets today than they have in the past, these firms would likely see lower growth.

In addition to potential concerns related to the relationship between overall stock market size and national economic variables. Levine and Zervos (1996) show that large and more efficient stock markets help to enhance national economic well-being. In particular, stock market development is "positively and robustly associated with long-run economic growth". Levine and Zervos (1998) show that "financial markets provide important services for growth and that stock markets provide different services from banks". This suggests that a smaller stock market which offered equity capital to fewer firms might have a negative impact on economic growth, and that bank financing is not a substitute for equity financing which small firms may have less access to in the current equity markets. While Levine and Zervos (1998) explicitly state that stock market size is not robustly linked to economic growth, their methods for examining stock market size differ from those in this current study.

Is the value of economic benefit provided by the stock market merely a byproduct of stock market size, or does the concentration of that market capitalization (i.e. the size of the

market in terms of number of firms) also matter? It remains unclear to date if broad access to equity capital is important to economic growth. Econometric constraints, particularly issues related to omitted variables, make answering this question at a macroeconomic level difficult. However, an alternative approach to examining this question is in the context of firm-level variables.

Fama and French (2001) note that the proportion of dividend paying firms has fallen dramatically from 66.5% in 1978 to 20.8% in 1999. They also note that the exchanges expanded rapidly as many new small firms entered the equity markets during this period with low profitability, but strong growth opportunities. Gao, Ritter, and Zhu (2013) show that the number of IPOs has slowed dramatically since 2000 (averaging 99 post-1999 vs. an average of 310 pre-2000), and suggest that this result is driven by a greater propensity among small firms to sell out to larger competitors.[4] Taken together with these two findings, one by-product of the shrinking stock market is that the marginal US publicly traded firm is now a later-stage, slower-growing company. Among other implications, if the marginal firm is growing more slowly, this would offer a partial explanation for the relatively resilient, but slow growth of the US economy over the last five years.

While many researchers have implicitly noted the declining size of the stock market as it relates to the number of observations in their samples across time, this paper is the first to focus on the effect as an important economic phenomenon. This study examines various firm characteristics during the period 1990 through 2012. In particular, it focuses on firm dividends, revenue and net income growth (excluding extraordinary items) as proxies for firm maturity and growth opportunities, and Altman Z Score as a proxy for firm stability. DeAngelo, DeAngelo,

[4] Throughout the text, when the term pre-2000 is used, this period encompasses data up to and including December 31, 1999. The term post-1999 encompasses all data beginning on January 1, 2000

and Skinner (2004) show that the number of firms paying dividends may have declined, but this is a largely a by-product of increased concentration in those firms paying dividends. This paper is consistent with that view, and finds that firms have become more stable, less profitable relative to their equity valuations, and their dividend payouts have increased since the turn of the millennium.

The economic rationale for these results is that later stage, cash flow-rich companies have increasingly bought out the firms with the best growth prospects over the last decade. Grullon, Michaely, and Swaminathan (2002) examine changes in dividends, and find that firms with large dividend increases see a fall in their cost of equity capital in subsequent years. Firms with lower equity cost of capital seeking growth opportunities might well look to purchase small firms with rapid growth. Pairing this trend with two recessions since 2000, and a general slowing of the number of IPOs, one would expect to see greater stability and slower growth in the marginal firm as the number of publicly traded firms falls.

This study finds that a 10 company decrease (increase) in the number of publicly traded firms is associated with a fall (rise) in average annual revenue growth rates of 4.7 basis points after controlling for other factors. The average annual net income growth rate (excluding extraordinary items) falls 12 basis points when the market experiences a 10 company decrease in size. Similarly, the average level of size-adjusted dividends paid by a firm increases (decreases) by 4.8% as the number of publicly traded firms falls (rises) by 10 companies. The marginal firm's Altman Z score increases (decreases) by roughly 2.6% as the number of publicly traded firms falls (rises) by 10 companies. Similarly, firm level investment scaled by assets falls as the number of publicly traded firms falls. This result could be due either to diminished competition between firms as the number of publicly traded companies shrinks, or to larger firms having less

ability to take advantage of meaningful investment opportunities (relative to their size) compared to smaller firms that populated the exchange prior to 2000. Regardless, the falling profitability and revenue growth of marginal firms over time may be due to falling levels of scaled firm investment – a possibility that is supported by research showing the importance of firm level investment in equity returns (see Chen, Novy-Marx, and Zhang, 2011). These results all hold after using various tests to address potential endogeneity concerns.

Overall these findings suggest that the corporate structure of the component companies in US equity markets changed considerably during the period from 1990 through 2012. The 1990s saw substantial equity growth built around a swelling number of high-growth low-profitability companies, while the period since the dot-com bubble has seen a shrinking stock market characterized by more mature companies with weaker growth profiles. These results offer a richer context to the findings of Fama and French (2001), and support the theory advanced by Gao, Ritter, Zhu (2013).

The rest of this paper is organized as follows. Section II discusses the background literature in this area, Section III reviews the data, methodology, and hypotheses. Section IV covers the results, and Section V concludes.

II. Background Literature

Beyond the work of Gao, Ritter, Zhu (2013), perhaps the line of the literature most closely associated with changes in the broader structure of the stock market over the last 15 years is the literature around the Sarbenes Oxley Act (SOX). The literature surrounding the effects of SOX is voluminous, but certain papers within that literature have examined the large number of companies that delisted from the US exchanges in the wake of that legislation. Engel, Hayes, and Wang (2006) show that SOX was associated with a significant increase in the number of firms

that went private, and that the legislation impacted firms differently. They conclude that SOX appears to have impacted the decision of firms to go private. Leuz, Triantis, and Wang (2008) examine the economic effects of a firm's decision to "go dark" or stop SEC reporting, but continue to publicly trade. They find that SOX causes a spike in these deregistrations driven by both increased compliance costs around SOX, and a desire by firm insiders to protect private control benefits and decrease outside investor scrutiny. They show that the decision to go dark is distinct from the decision to go private.

Similarly, Marosi and Masoud (2007) show that the decision to go dark is associated with a dramatic fall in the liquidity of shares in a firm, and that this decision has a major negative impact on firm valuation and cumulative abnormal returns. This suggests that the loss of liquidity and public market scrutiny associated with being a publicly listed firm is a major cost to equity holders in a firm. Although both of these papers show evidence that going dark is detrimental to the firm itself, this paper examines the effects of the changing broader stock market structure on firms that remain listed. Fama and French (2000) show that the large increase in the number of publicly traded firms between 1978 and 1999 is driven by an increase in the number of small, high-growth firms.

Finally, given that SOX changed the costs of being publicly traded, it is also important to examine what benefits come out of being a public firm. Pagano, Panetta, and Zingales (1998) find that the process of going public is associated with a reduction in the cost of debt capital for firms, and that going public enables firms to rebalance their capital structure after periods of high growth. They also show that going public also enables equity holders in the private firm to liquidate their holdings, and that the act of going public serves a valuable marketing purpose by raising the firm's profile with potential customers.

Carpentier, Cumming, and Suret (2011) show that IPOs in the US have higher relative valuations on equity markets than Canadian IPOs despite the firms being of comparable quality. They find that this is an artifact of the liquidity gaps between US and Canadian firms. The implication of their finding is that the increased valuation of US IPOs has an especially large wealth effect on equity holders in those IPOs. Similarly, Doidge, Karolyi, and Stulz (2009) find that foreign firms cross-listed in the US gain a valuation premium compared with cross-listing in other major financial markets like London. This suggests that access to US equity markets has significant economic value for firms, and similarly that loss of access to this market does economic damage to a firm.

III. Hypotheses, Data, and Methodology

A. Hypotheses

In examining how the market structure has changed over the course of expansion and contraction of the stock market since 1990, several noteworthy variables are of key interest. To the extent that Gao, Ritter, Zhu (2013) are correct and smaller firms have a greater propensity to sell out to larger firms, the question becomes one of 'what benefit do larger firms derive from buying these smaller firms?' One possible answer to this question is that larger firms get better opportunities for growth and profitability by buying smaller ones. If the first half of the sample period saw larger numbers of small fast growing firms entering the markets, then these additional firms boost the average growth rate across the market as a whole. However, over time if these firms are taken over by larger slower growing companies, and are not replaced by new firms in the market, then the average growth rate falls. Given the pattern of firm entry and exit during the 1990s, the broad expectation is that over time as smaller fast-growing firms are bought out by

larger firms looking for new growth opportunities, mean market-wide growth should slow. This leads to Hypothesis I, which is examined in Tables III and IV.

Hypothesis I: Increases (Decreases) in firm count are associated with rising (falling) marginal revenue and net income growth rates as small fast growing firms are absorbed by larger ones and not replaced

Additionally, the major implication of Fama and French (2001) is that dividend payouts have decreased over time and firms have substituted away from dividends to other forms of cash returns to shareholders (i.e. share repurchases). Yet DeAngelo, DeAngelo, and Stulz (2006) suggest that firms which are further along in their life cycle should pay out larger amounts of cash to shareholders in part as a way to avoid governance issues. Given that the 1990s saw a larger population of firms, especially small firms as suggested by Fama and French, one would expect that an increase in firm count should be associated with a fall in the level of size-adjusted dividends, with a decrease in firm count being associated with a rise in the level of size adjusted dividends (dividends per billion in firm assets). This study uses the change in cash dividends paid per billion dollars of firm assets as the measure of dividends. This avoids issues with volatility in equities that result with measures like dividends per share.[5] Since the objective is to measure the cash payout of firms over time while taking into account growth in the overall economy, this measure avoids biases from equity market expectations. This leads to Hypothesis II, which is examined in Table V.

Hypothesis II: Increases (Decreases) in the firm population are associated with decreases (increases) in the dividend as smaller firms have less capacity to pay larger dividends and have better growth opportunities.

[5] We thank an anonymous referee for the suggestion to use changes in dividends and changes in Altman Z scores rather than the levels of these variables in order to avoid a unit root problem.

Finally, if Hypotheses I and II hold, then it would suggest that the initial rise in the firm count on US exchanges made the marginal firm riskier and less stable given the faster growth and lower dividend payout associated with the increased firm counts. On the other side, as larger firms absorbed smaller firms, and that supply of small firms was not replaced, the marginal firm became increasingly stable and better able to afford a dividend. One metric to measure riskiness and stability in a firm is the Altman Z score.[6] Higher Altman Z values indicate both better financial stability (as measured by metrics like sales and EBIT) and greater confidence from the market about the future success and stability of the firm (as measured by market equity), whereas lower Altman Z values are suggestive of riskier and less stable firms that the market places a lower value on. The Altman Z score forms the basis of Hypothesis III.

Hypothesis III: An increase (decrease) in the firm population is associated with decreases (increases) in the change in Altman Z scores at the marginal firm after controlling for other factors as it reflects higher levels of riskiness in the firm.

B. Data and Methodology

Data on firm financials comes from Compustat quarterly filings covering the period 1990 to 2012. For sample consistency, firms in the sample must be publicly traded with available data in Compustat including data on quarterly profit (or loss), stock price, number of shares outstanding, and dividends paid. Only firm observations are included wherein all independent variables for the given firm are available during the period when the firm is publicly traded in the sample period.[7] This yields a total sample size of approximately 200,000 firm-quarter observations. Certain variables including Revenue Growth, Profit Growth, ROA, and Altman Z scores are all calculated based on Compustat data. To calculate the number of publicly traded

[6] Results are robust to the use of Tobin's Q as an alternative measure of stability.
[7] Results are robust to using varying sample sizes and using 0 as the value for certain variables (.e.g acquisitions) when those variables are missing.

firms each quarter during the sample, Compustat is used. This key variable is labeled *Firm Count*.[8] Within this dataset the number of publicly traded firms is fairly volatile as Figure 1 above illustrates. From one quarter to the next, the number of publicly traded firms may rise or fall by as much as 100-400 firms. This quarterly variation is important as a driver of the firm level effects of interest in the study. However, to account for seasonal trends, quarterly dummies are included in all regressions. Additionally, substantially yearly volatility in *Firm Count* is also observed. During the 2000 bursting of the dotcom bubble, roughly 1,000 firms disappeared during an 18 month period representing about 10% of the total number of publicly traded firms. At other times, the number of firms that are publicly traded has expanded rapidly. As such, yearly dummies are included in all regressions where the specification allows for it. The end result of this variation in *Firm* Count during the 22 year sample period is a rich dataset that has substantial variation in both increases and decreases of *Firm Count*.

The primary regression specification is a standard OLS regression with a battery of firm variables, firm-level fixed effects to control for unobservable effects, and the market level *Firm Count* variable of interest, as well as year and quarter dummies. Thus, the results capture time-varying changes firm financials as they relate to market size after accounting for seasonal effects. To the extent that the US markets see larger changes in one of the firm level variables of interest (Revenue Growth, Profit Growth, Changes in Dividends, Changes in Investment, and Changes in Altman Z) consistently in one quarter or in a given year related to a macro event (e.g. a recession), this effect should be captured by the dummy variables. Unexpectedly large changes in these variables in a sequence of quarters and years are the residual effect captured by the firm specific time-varying and market-level time-varying factors (i.e. *Firm Count*) in these

[8] Results are robust to using CRSP to determine the number of firms that are publicly traded either on a monthly or quarterly basis.

regressions. The unit of observation throughout the paper is a firm-quarter observation with a total number of observations of 195,714.[9]

IV. Results

The descriptive statistics in Table I below reveal considerable variation across the sample period. The standard deviations are large on revenue growth, profit growth, size-adjusted dividends, and Altman Z, but the basic difference between the pre-2000 mean and post-1999 mean is economically though not statistically significant in each case.[10] This lack of statistical significance is not surprising given the variation in the sample; for instance the change in revenue growth over time is dwarfed by the difference between firms in any given year in revenue growth. A multivariate approach addresses this issue of course.

The first three rows show that profit growth and dividends rise in the second part of the sample, while revenue growth falls and Altman Z stays largely the same. The number of firms is somewhat lower in the post-1999 period, though not dramatically so. This is largely because the 1990s saw a rise in the number of publicly traded firms that matched the fall in the post-1999 period. While it might be natural to dismiss this change in the firm population post-1999 as largely a function of the market returning to normal after the dotcom bubble, it is important to remember two facts. First, the stock market size continued to shrink consistently throughout the post-1999 period including in the years after dotcom bubble, but before the 2008 recession. The decline in firm counts is not driven solely by firms going bankrupt, but also by the dramatic fall in the number of IPOs referenced by Gao, Ritter, Zhu (2013). Second, the economy has roughly

[9] Observations have been dropped where firms have a stock price of less than $5, a market capitalization of less than $100 million, or where data is otherwise incomplete (e.g. data on taxes is not available in every quarter)
[10] The year 1999 is included in the pre-2000 sample segment, while the year 2000 is included in the post-1999 segment.

tripled in size since 1990 without any corresponding growth in the number of publicly traded firms, which in itself seems to be an unintuitive puzzle.

The other firm level variables include total assets, total liabilities, cash, selling and general administrative expenses (SG&A hereafter, a proxy for overhead cost), property, plant and equipment expenses (PP&E hereafter, a proxy for physical investment), and acquisition expenses. Each of these variables displays significant growth from the pre-2000 period mean to the post-1999 mean which confirms the axiomatic observation that as the stock market population has shrunk; the average firm has increased in size. The standard deviations on all of these variables dwarf these mean differentials suggesting a high degree of variation across the entire sample period regardless of the firm population size.

[Insert Table I Here]

A look at the correlations between the variables of interest in Table II reveals that most of the variables have low, but statistically significant correlations, to firm count. While not causal of course, this does imply an interesting pattern. The Revenue Growth, Altman Z, and Dividends measures all have small positive correlations with the independent variables. Total assets is correlated with many other variables, most notably total liabilities. Given scale issues, the natural log of assets is used as a proxy for size in subsequent regressions, while leverage is used to proxy for financial risk taking in place of an absolute measure like total liabilities. *Revenue Growth* and *Firm Count* display a positive correlation consistent with Hypothesis I, while *Dividends* and *Firm Count* have a small negative relationship. This is consistent with a shrinking stock market size being associated with slower firm growth and higher dividend levels. *Altman Z* has a positive but small correlation with *Firm Count*. This is in contrast to Hypothesis III above, but this coefficient is statistically and economically insignificant. One possible explanation for this

coefficient size is that *Firm Count* is sometimes positively correlated with *Altman Z* and sometimes negatively correlated. Given this variation, a multivariate approach to control for these disparate factors is needed.

[Insert Table II Here]

Next, Table III begins multivariate analysis by examining the relationship between year-over-year revenue growth at the firm level and the *Firm Count*. The basic specification used in this table is repeated in all future tables throughout the remainder of the paper. This specification broadly follows the specifications used in the going dark literature including the work of Engel, Hayes, and Wang (2006), and Triantis, Leuz, and Wang (2008).[11] Column 1 depicts a positive coefficient of 0.047 on *Firm Count*, this indicates that a one unit change in the *Firm Count* variable is associated with a positive increase of ~4.7 basis points in revenue growth. Since *Firm Count* is measured in tens of firms, this means that the marginal 10 firm increase (decreases) is associated with a 5 basis point expansion (contraction) in annual revenue growth. Given that the mean revenue growth is about 13% for the overall sample, this is economically as well as statistically significant especially in the context of the disappearance of thousands of firms from the exchanges.

One question these results raise is how a change in firm concentration on the exchanges impacts individual firms directly. There are several channels by which this might occur. First, as the number of firms shrinks (grows) over time, there are fewer (more) candidates for mergers which in turn would directly impact the other firms in the market. This could lead to changes in revenues or profits over time, especially for serial acquirers. Second, as the concentration of the exchanges increases, more attention is likely to be focused on the remaining firms which in turn

[11] Results are robust to a variety of specifications that use alternative control variables including equity market value, past year's stock returns, and proxies of liquidity like trade volume.

may lead them to behave differently including taking fewer risks and focusing more on shareholder value. Third, as the number of firms shrinks, competition between firms may decrease either for investment dollars or at the core business, again influencing corporate actions. We indirectly examine this issue in a new table looking at firm level investment as a left-hand side variable. Fourth, the number of firms on the exchange may be a proxy for the point a firm is at in its lifecycle, since firms today are typically larger and older than the firms that populated the exchanges in the 1990s. This lifecycle effect in turn would influence all of the firm level variables mentioned above.

Regardless of the channel, a reasonable interpretation of these results is that as the population of the exchanges shrunk over time, the remaining firms began to look very different on average than the firms that were leaving (or never entered). Thus for instance, Microsoft may not be directly influenced by the delisting of a small tech firm, but rather that the disappearance of that small tech firm changes the average characteristics of Microsoft and all remaining firms incrementally. Mergers and bankruptcies would have similar impacts on average characteristics when observed en masse.

Notably, this positive relationship between exchange size and revenue growth is a result driven mainly by the post-1990s period. The period before 2000 shown in column 2 does not feature a statistically significant relationship between *Revenue Growth* and *Firm Count*. One plausible explanation for this result is that the addition of many new small firms during the course of the late 1990's had little effect on the revenue growth profile of the overall population since the existing firms broadly resembled the new firms entering the exchange. Hence as long as there were many existing small firms with rapid revenue growth, the addition of more such firms had little impact.

In contrast, in the post-2000 period, there is an extremely significant relationship between *Firm Count* and *Revenue Growth*. Column 3 shows that the relationship between these two variables for the overall post-1999 period is a coefficient of 0.088 or 8.8 basis points in additional positive (negative) revenue growth for each addition (loss) of 10 firms. Since the post-1990s period has been largely characterized by a persistent shrinking of the exchange size, the positive coefficient here is really a function of a fall in both the number of publicly traded firms and the revenue growth rates of remaining firms. This result is not a function of the 2008 recession as column 4 shows. Instead, one explanation for these findings is that over and above the dotcom bubble and 2008 recession both of which eliminated many small firms, larger firms have been buying out the smaller firms with the fastest growth rates. This is consistent with Gao, Ritter, Zhu (2013). As these small fast growing firms are absorbed into larger firms, the dearth of new IPOs has meant that these small firms are not being replaced. The end result is a slower rate of overall revenue growth for the marginal firm in the market.

[Insert Table III Here]

To control for the possibility that the findings in Table III are primarily a by-product of the use of revenue growth as a proxy for firm growth opportunities, Table IV instead examines annual net income growth (excluding extraordinary items). The use of this proxy for growth is perhaps more in line with the measure that investors are most likely to care about. Since stocks are generally valued based on their expected stream of future cash flows, profit growth is likely to be a more valid measure for the growth opportunities at the firm that investors care about.

The results in this table are largely reminiscent of Table III. The positive coefficient in column 1 shows that the disappearance of 10 firms from the market is associated with a fall in profit growth of 12 basis points. This represents a roughly 1% fall in the growth rate of profits

given a mean profit growth rate of about 12% (see Table I above). As in Table IV, this effect is stronger in the post-1999 period than in the earlier period. Column 2 shows a marginally significant effect from the addition of 10 new firms of 3 basis points in additional net income growth. This compares to 16.5 basis points (column 4) in additional net income growth in the post-2000 period even after excluding the effects of the 2008 recession.

Again, the implication of this result is that the net loss of firms from the exchanges (due to a combination of buyouts, recessions, and a lack of new IPOs) had a substantial negative impact on overall market growth rates. The "lost" firms have not been replaced by new firms entering the market, and the result is a lower marginal net income growth rate. The other interesting fact which is replicated in Table III and Table IV is the relative damage done to the market in the post-1999 period from firm losses is greater than the benefit that was accrued from firm gains in the pre-2000 period.

[Insert Table IV Here]

Table V moves on from questions of growth to examine the impact of the shrinking stock market on average firm maturity vis-à-vis dividends. In this case, the table examines the change in size-adjusted dividends. Here the dependent variable *Dividends* is the change in cash dividend paid by a given firm in a given quarter per billion dollars of assets (i.e. change in total cash dividends divided by total assets in billions). As in Tables III and IV, column 1 examines the relationship between *Dividends* and the other variables for the entire sample, while column 2, 3, and 4 look at specific periods of time.

Column 1 shows that *Dividends* across the sample fall as *Firm Count* rises. Specifically, a 10 company increase in the number of publicly traded firms is associated with a decrease of 4.8% in the growth rate of dividends. This is an economically and statistically significant figure.

Generally this result is consistent with the theory that smaller firms are absorbed by larger firms during the sample resulting in more dividends paid by the marginal firm. This view is further supported by the results in columns 2 to 4. Column 2 shows that *Dividends* is weakly significantly associated with *Firm Count* in the Pre-2000 period. Instead, as column 4 shows, the broader result for the total sample is driven by the post-1999 period even after excluding 2008. It is important to exclude 2008 since the severity of the recession drove many firms out of business and simultaneously led to many firms suspending their dividend. These results hold despite controlling for a battery of firm variables that proxy for overhead (*SG&A*), investment levels (*PP&E*), acquisitions (*Acquisition Expense*), tax costs (*Taxes*), and future investments (*Retained Earnings*). The regressions all include year dummies, quarter dummies, and firm fixed effects as mechanisms to control for unobservable factors which might bias the results.

[Insert Table V Here]

Table VI examines the relationship between the quarter-by-quarter change in a firm's *Altman Z* and *Firm Count* in a multivariate context. Consistent with previous tables, column 1 examines the total sample period, while columns 2 to 4 examine sub-periods. For the complete sample period, Column 1 shows that a 10 firm drop in *Firm Count* is associated with a 2.6% fall in the *Altman Z*. Drilling down into the sub-periods reveals a more nuanced picture however. In the Pre-2000 sample, there is a small positive association between *Altman Z* and *Firm Count*. Since Altman Z scores are partially based on market equity values, this result is consistent increased optimism regarding small companies and their prospects during the rapid economic growth of the 1990s. In the Post-1999 period the effect reverses. The marginal effect of a 10 firm increase in the stock market population is a fall in *Altman Z* of 3.4% (2.5% after excluding the 2008 recession). This result is consistent with Hypothesis III.

The switch in sign from the first portion of the sample to the second is interesting and worth a deeper investigation. In particular, the hypothesis is that as the number of firms falls, the remaining firms become more stable and receive higher equity valuations relative to the replacement value of their assets. During the 1990s however, it appears that this relationship did not hold. Instead, increased numbers of firms entering the exchanges led were associated with larger equity valuations consistent with investors gaining greater and greater enthusiasm for the prospects of these firms. Hence Altman Z appears to have had distinct implications in each period.

[Insert Table VI Here]

Next, Table VII examines how the investment decision of the marginal firm is impacted by changes in the firm population of the exchanges. Investment by firms is increasingly becoming an important decision in the financial literature especially in the investments literature. Historically, firm investment has been important as a factor in aspects of corporate finance such as financial flexibility (Cleary, 1999), and it is increasingly being considered in asset pricing models (Chen, Novy-Marx, Zhang, 2011) though its inclusion can be contentious (Fama and French, 2008). Equally importantly in the current context, there is evidence that investment decisions by firms are linked to broader national economic growth (Stulz, 2001; Novy-Marx, 2007). Hence firm level investment is potentially an important variable to consider.[12]

Table VII examines changes in firm investment on a quarterly basis as measured by the level of invested capital of the firm divided by the assets of the firm. Column 1 reveals that for the overall sample period, firm count is positively related to firm investment. A 10 firm increase in the exchange population is associated with 4.6% higher firm investment. One implication of this result is that when the exchanges had a larger number of firms, firm level investment was

[12] We thank an anonymous referee for this suggestion.

higher. This result could be driven by either greater competition among firms leading increased investment to compete, or simply by greater availability of attractive investments through smaller firms when exchanges were larger and less concentrated.

Columns 2 through 4 reveal that this result is driven by the post-1999 period shrinking of the exchanges which saw firm investment whither as the number of firms dropped over time. Again, this could be due to either greater competition between more publicly traded firms leading to increased investment, or to small firms having attractive investment opportunities not available to larger firms. Whatever the reason, scaled firm investment has declined for the marginal firm as the number of publicly traded firms has declined. These results suggest one possible channel for the diminished profit and revenue growth found above.

[Insert Table VII Here]

Robustness Checks:

One of the primary concerns with the results thus far is the possibility of an endogeneity issue. In particular, it is possible that *Firm Count* is correlated with an unobserved variable driving both the concentration of firms on the exchanges and the various dependent variables of interest. Fixed effects at the firm and year level can help to address this concern to some extent, but they are perhaps insufficient to alleviate endogeneity concerns on their own.[13]

To combat endogeneity concerns, a series of possible approaches can be used. First, in Table VIII, a two-stage least squares (2SLS) approach is employed. This procedure uses an instrumental variable in place of *Firm Count*. A Herfindahl-Hirschman Index (HHI) is used to measure the industry concentration for every quarter based on the number of publicly traded

[13] In addition to the endogeneity control efforts shown below, results are also robust to the dynamic panel GMM approach recommended by Wintoki, Linck, and Netter (2012). Those results are not shown here due to space constraints.

firms in each four-digit SIC code and their associated revenues.[14] Valid instruments must satisfy two conditions: 1) the relevancy condition− the instrument and the endogenous variable have to be correlated after controlling for all other exogenous variables, and 2) the exclusion restriction− the instrument should not be correlated with the error term from the second-stage regression. While no instrument is perfect, the HHI instrument seems to satisfy both conditions of validity. The number of firms on the exchanges displays a statistically significant correlation of 0.324 with the HHI measure. Similarly, HHI is not statistically correlated with the error term from the regression.

Table VIII shows results from the instrumental variable (2SLS) regressions. The upper rows of the table shows results from the first-stage OLS regressions using the *Industry HHI* as the dependent variable; predicted values from the first-stage are then second-stage regressions. The instrument exhibits significant explanatory power for the exchange population. The coefficient on Industry HHI is positive and statistically significant. The partial *F*-tests (*p*-value of 0.000) reject the null hypothesis that the instruments are jointly zero. In addition, the Hansen's *J*-statistic overidentification test (χ^2) fails to reject the null hypothesis that the instruments are valid.[15] Column 2 reports results from the second-stage regressions and confirms the prior findings. Firm count continues to be associated with higher firm profitability growth, even after correcting for endogeneity using the instrumental variable approach.[16]

[Insert Table VIII Here]

[14] Results are similar when calculating HHI by two digit SIC code.
[15] *p*-value from Hansen's J-test statistics is 0.237.
[16] Similarly, firm count continues to be statistically significant in 2SLS framework for regressions of revenue growth, change in cash dividends, firm investment, and change in Altman Z.

Next, as an alternative approach to address endogeneity concerns, Table IX uses the one year lagged value of *Firm Count* as an instrumental variable.[17] In addition, the Hansen *J*-test of overidentifying restrictions fails to reject the null hypothesis that our instruments are valid.[18] To conserve space, only the coefficients on the lagged *Firm Count* variable is reported and the control variables are omitted. The results in Table IX confirm the prior findings. The coefficient on *Firm Count* remains positive and statistically significant in columns 1, 2, and 4, and negative and statistically significant in column 3.

[Insert Table IX Here]

Finally, as another alternative to deal with endogeneity, Table X examines a difference-in-difference framework for *Firm Count*. Specifically, in column 1, the table uses dependent variables equal to the following:

(1) D-I-D Profit Growth = (Profit Growth of Industry i – Profit Growth of Industry j)$_t$ – (Profit Growth of Industry i – Profit Growth of Industry j)$_{t-4}$

Here *Industry i* is a four-digit SIC denominated industry for the firm during quarter t. Industry j is a propensity score matched industry with no firm shrinkage in quarter t.[19] Each regression uses a dummy variable equal to 1 if *Industry i* shrinks by at least one firm during quarter t. Thus the specification captures the change in differences between propensity score matched industry profit growth rates for two industries; one that is seeing a declining firm count, and the other which is not. A similar approach is used in columns 2 through 4.

Column 1 reveals that profit growth is significantly associated with the *Shrinkage* dummy with a coefficient of -0.169.This indicates that in the marginal industry that shrinks in a given

[17] Similar results hold when using lags of 1, 2, and 3 quarters. Including all four lagged quarterly *Firm Count* variables produces statistically significant results on the *Firm Count* variable as well.
[18] The Hansen *J*-statistic is 18.3 (p-value of 0.194).
[19] Propensity score matching is based on the control variables used in tables above along with the previous year's dependent variable, for instance profit growth in column 1 during t-8 to t-5.

quarter, profit growth rates are slower by 16.9%. This would be roughly equivalent to a profit growth rate of 5% for an industry that shrank versus 6% for a matched industry that did not shrink. Similarly, column 2 shows a statistically and economically significant coefficient of -0.208 suggesting that revenue growth rates are 20.8% lower in industries that shrink compared to those that do not in a given quarter. Column 3 displays a positive coefficient of 0.083 indicating that Altman Z scores are an average of 8.3% higher in shrinking industries compared with non-shrinking ones. Finally, column 4 has a negative and significant coefficient of -0.115 indicating that shrinking industries see firm investment levels that are lower by 11.5% compared to matched industries.

[Insert Table X Here]

V. Conclusion

Past research dealing with the firm population in capital markets has tended to look at the issue from the perspective of either IPOs or delistings. Yet neither side tells the complete story. While delistings and buyout activity have increased, the number of IPOs has also shrunk dramatically. Against this backdrop and an increasing stock market capitalization, asset concentration has increased dramatically over time. The increased size of firms has led to higher levels of dividend payouts and greater firm stability as measured by Altman Z, but it has also led to slower rates of growth for firms. These results shed new light on the issues raised by Gao, Ritter, Zhu (2013), as well as the on-going debate over the "disappearance of dividends" first noted by Fama and French (2001).

The broader stock market is important to overall economic growth and hence so is the change in the character of the marginal publicly traded firm. The expanding stock market of the 1990s had a small, but positive, impact on marginal growth rates. In contrast, the stock market

since 2000 has seen a dramatic and persistent decline in the number of publicly traded firms, and this decline is associated with profit and revenue growth rates that are roughly 1% lower for each 100 firm drop in overall market size. These statistically and economically significant results are robust to alternative measures of firm growth and the inclusion of firm fixed effects, year dummies, and quarter dummies. In light of these findings, further research into the relationship between market capitalization concentration and firm characteristics is warranted.

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Table I: Univariate Statistics

See appendix I for variable definitions. None of the differences shown here are statistically significant between the two periods due to the significant variation in values between firms on the exchange at any given point in time.

Variable	Mean	Standard Error	Pre-2000 Mean	Post-1999 Mean	Difference	P-Value
Revenue Growth	0.13	0.34	0.14	0.13	0.02	0.520
Profit Growth	0.12	2.48	0.09	0.14	-0.05	0.491
Dividends	29.72	166.37	21.29	34.86	-13.57	0.467
Altman Z	3.53	6.59	3.42	3.75	-0.33	0.480
Firm Count	8,399.00	1,139.49	8,683.29	8,196.02	487.27	0.666
Total Assets	4,620.86	25,688.64	3,235.58	5,611.66	-2,376.08	0.463
Total Liabilities	3,650.08	23,486.25	2,588.50	4,409.36	-1,820.86	0.469
Cash	358.13	3,700.95	232.39	446.21	-213.82	0.477
SG&A	82.40	332.26	64.81	94.11	-29.30	0.465
PP&E	938.18	3,418.95	763.10	1,063.63	-300.53	0.465
Acquisition Expenses	32.26	319.69	25.24	36.51	-11.27	0.486
Invested Capital	1,894.31	8,039.63	1,240.22	2,361.53	-1,121.31	0.445
Retained Earnings	405.85	2,341.47	307.72	474.28	-166.56	0.472
Taxes	33.79	195.28	26.60	37.46	-10.86	0.478

Table II: Correlations Between Firm-Level Variables and Aggregate Firm Count

See appendix I for variable definitions. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. The table shows some statistical significance between variables which is unsurprising given that variables like total assets, total liabilities, retained earnings, and others are clearly all linked to firm size however that may be defined. Importantly, firm count, while statistically correlated to many of the other variables, shows less economically significant correlations with correlation coefficients generally below 5%.

	2	3	4	5	6	7	8	9
1	0.068***	-0.001	0.039***	0.074***	-0.019***	-0.018***	-0.005**	-0.024***
2	1	0.002	-0.036*	-0.006*	0.012*	0.009*	0.009*	0.036*
3		1	0.000	0.007	0.000	0.001	0.000	0.004
4			1	0.005**	0.161**	0.152***	0.088***	0.091***
5				1	-0.023***	-0.018***	-0.020***	-0.035***
6					1	0.995***	0.740***	0.503***
7						1	0.755***	0.436***
8							1	0.377***
9								1
10								
11								
12								
13								

10	11	12	13	14
			1	0.589***
		1	0.604***	0.373***
	1	0.331***	0.216***	0.106***
1	0.226***	0.613***	0.523***	0.490***
0.609***	0.150***	0.677***	0.585***	0.494***
0.107***	0.070***	0.501***	0.360***	0.158***
0.284***	0.205***	0.751***	0.508***	0.272***
0.354***	0.224***	0.793***	0.557***	0.322***
-0.041***	0.011***	-0.038***	-0.033***	-0.010***
0.093***	0.150***	0.201***	0.128***	0.122***
0.000	0.002	0.000	0.001	0.003
0.022*	0.040*	0.010*	0.028*	0.013***
-0.028***	0.052***	-0.018***	-0.024***	0.017***

1. Revenue Growth
2. Change in Cash Dividends
3. Change in Altman Z Score
4. Change in Investment
5. Firm Count
6. Total Assets
7. Total Liabilities
8. Cash Holdings
9. SG&A
10. PP&E
11. Acquisition Expense
12. Invested Capital
13. Retained Earnings
14. Taxes

Table III: Revenue Growth Rates And Aggregate Stock Market Size

See appendix I for variable definitions. T-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Heteroskedasticity robust standard errors are used in all regressions. Dependent variables are shown along the top horizontal row, while independent variables appear on the far right column. The basic specification in this table is:

Revenue Growth Rate = β_0 + β_1*Firm Count + β_2*ln Assets + β_3*Leverage + β_4*Cash/Total Assets + β_5*SG&A/Total Assets + β_6*PP&E/Total Assets+ β_7*Acquisition Expense + β_8*Retained Earnings/Total Assets + β_9*Taxes/Total Assets + β_i*Quarter Dummies + Firm FEs + ε

	All Years	Pre-2000	Post-1999	Post-1999 excl 2008
VARIABLES	(1) Revenue Growth	(2) Revenue Growth	(3) Revenue Growth	(4) Revenue Growth
Firm Count	0.047***	0.009	0.088***	0.072***
	[7.98]	[2.47]	[9.81]	[7.74]
ln_Assets	0.029***	0.065***	0.031***	0.033***
	[9.10]	[9.05]	[7.89]	[8.27]
Leverage	0.099***	0.026***	0.003	0.008**
	[3.89]	[4.70]	[1.00]	[2.49]
Cash/Total Assets	-0.003**	-0.004**	-0.002*	-0.002
	[-2.55]	[-3.09]	[-1.67]	[-1.38]
SG&A/Total Assets	0.001***	0.002***	0.001***	0.002***
	[2.87]	[4.08]	[2.42]	[3.11]
PP&E/Total Assets	-0.001***	-0.001***	-0.002***	-0.002***
	[-7.97]	[-6.88]	[-9.32]	[-9.13]
Acquisition Expense	0.002***	0.004***	0.001***	0.001***
	[4.57]	[8.98]	[3.36]	[3.68]
Retained Earnings/TA	-0.002***	-0.003***	-0.001***	-0.001***
	[-5.09]	[-9.64]	[-2.78]	[-3.27]
Taxes/Total Assets	0.003**	0.002**	0.003**	0.003**
	[4.77]	[4.70]	[4.81]	[4.85]
Constant	-0.059***	-0.028***	-0.137***	-0.111***
	[-9.55]	[-3.74]	[-6.26]	[-4.97]
Year Dummies	YES	YES	YES	YES
Quarter Dummies	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES
Observations	195,714	49,022	146,692	135,512
R-Squared	0.054	0.029	0.066	0.067

Table IV: Profit Growth Rates And Aggregate Stock Market Size

See appendix I for variable definitions. T-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Heteroskedasticity robust standard errors are used in all regressions. Dependent variables are shown along the top horizontal row, while independent variables appear on the far right column. Profit Growth is year over year change in net income excluding extraordinary items. The basic specification in this table is:

Profit Growth Rate = β_0 + β_1*Firm Count + β_2*ln Assets + β_3*Leverage + β_4*Cash/Total Assets + β_5*SG&A/Total Assets + β_6*PP&E/Total Assets+ β_7*Acquisition Expense + β_8*Retained Earnings/Total Assets + β_9*Taxes/Total Assets + β_i*Quarter Dummies + Firm FEs + ε

	All Years	Pre-2000	Post-1999	Post-1999 excl 2008
VARIABLES	(1) Profit Growth	(2) Profit Growth	(3) Profit Growth	(4) Profit Growth
Firm Count	0.120**	0.030*	0.173***	0.165***
	[2.38]	[1.57]	[4.09]	[3.88]
ln_Assets	0.176***	0.274***	0.179***	0.173***
	[8.26]	[5.86]	[6.73]	[6.64]
Leverage	0.124***	0.195***	0.0118***	0.0116***
	[-7.54]	[-5.36]	[-5.68]	[-5.40]
Cash/Total Assets	-0.002	-0.002	-0.002	-0.002
	[-0.38]	[-0.45]	[-0.30]	[-0.16]
SG&A/Total Assets	0.005	0.004	0.005	0.006
	[1.15]	[0.39]	[1.44]	[1.99]
PP&E/Total Assets	-0.038***	-0.013	-0.042***	-0.053***
	[-3.92]	[-1.36]	[-3.50]	[-4.15]
Acquisition Expense	0.015**	-0.007	0.017**	0.015**
	[2.40]	[-1.16]	[2.36]	[2.03]
Retained Earnings/TA	0.003	0.009	0.003	0.003
	[0.46]	[0.72]	[0.35]	[0.41]
Taxes/Total Assets	0.070***	0.074***	0.068***	0.063***
	[7.74]	[6.29]	[6.03]	[5.63]
Constant	-0.812***	0.242***	-0.990***	-0.870***
	[-5.70]	[-2.19]	[-6.35]	[-6.12]
Year Dummies	YES	YES	YES	YES
Quarter Dummies	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES
Observations	195,714	49,022	146,692	135,512
R-Squared	0.044	0.041	0.046	0.045

Table V: Change in Cash Dividends And Aggregate Stock Market Size

See appendix I for variable definitions. T-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Heteroskedasticity robust standard errors are used in all regressions. Dependent variables are shown along the top horizontal row, while independent variables appear on the far right column. The basic specification in this table is:

Δ Dividend $= \beta_0 + \beta_1$*Firm Count $+ \beta_2$*ln Assets $+ \beta_3$*Leverage $+ \beta_4$*Cash/Total Assets $+ \beta_5$*SG&A/Total Assets $+ \beta_6$*PP&E/Total Assets$+ \beta_7$*Acquisition Expense $+ \beta_8$*Retained Earnings/Total Assets $+ \beta_9$*Taxes/Total Assets $+ \beta_i$*Quarter Dummies + Firm FEs + ε

	All Years	Pre-2000	Post-1999	Post-1999 excl 2008
	(1)	(2)	(3)	(4)
VARIABLES	Δ Dividend	Δ Dividend	Δ Dividend	Δ Dividend
Firm Count	-0.048**	-0.006*	-0.073***	-0.065***
	[-2.54]	[-1.91]	[-9.92]	[-7.86]
ln_Assets	-0.122	-2.017***	0.431***	0.519***
	[-1.30]	[-10.71]	[3.77]	[4.42]
Leverage	0.330***	1.253***	0.014	-0.023
	[4.81]	[8.92]	[0.18]	[-0.27]
Cash/Total Assets	-0.001	-0.018***	-0.007	-0.009
	[-1.41]	[-6.50]	[-1.04]	[-1.30]
SG&A/Total Assets	0.085***	0.064***	0.090***	0.086***
	[22.39]	[9.72]	[19.00]	[17.44]
PP&E/Total Assets	0.067***	0.018***	0.081***	0.087***
	[18.53]	[12.64]	[18.95]	[19.83]
Acquisition Expense	0.075***	0.042***	0.041***	0.062***
	[6.65]	[14.19]	[3.37]	[4.81]
Retained Earnings/TA	0.104***	0.233***	0.082***	0.078***
	[30.88]	[20.66]	[20.45]	[19.10]
Taxes/Total Assets	0.222***	0.058***	0.185***	0.220***
	[54.12]	[46.44]	[41.79]	[45.41]
Constant	-4.38***	-2.74***	-11.36***	-12.46***
	[-7.04]	[-4.49]	[-7.93]	[-8.78]
Year Dummies	YES	YES	YES	YES
Quarter Dummies	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES
Observations	195,714	49,022	146,692	135,512
R-Squared	0.149	0.187	0.146	0.148

Table VI: Change in Altman Z And Aggregate Stock Market Size

See appendix I for variable definitions. T-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Heteroskedasticity robust standard errors are used in all regressions. Dependent variables are shown along the top horizontal row, while independent variables appear on the far right column. The basic specification in this table is:

Δ Altman Z Score = β_0 + β_1*Firm Count + β_2*ln Assets + β_3*Leverage + β_4*Cash/Total Assets + β_5*SG&A/Total Assets + β_6*PP&E/Total Assets+ β_7*Acquisition Expense + β_8*Retained Earnings/Total Assets + β_9*Taxes/Total Assets + β_i*Quarter Dummies + Firm FEs + ε

	All Years	Pre-2000	Post-1999	Post-1999 excl 2008
VARIABLES	(1) Altman Z	(2) Altman Z	(3) Altman Z	(4) Altman Z
Firm Count	-0.026***	0.002	-0.034***	-0.025**
	[-4.07]	[0.17]	[-3.76]	[-2.34]
ln_Assets	0.980***	1.229***	0.886***	0.852***
	[30.56]	[19.90]	[24.78]	[23.19]
Leverage	-0.963***	-1.192***	-0.850***	-0.823***
	[-38.58]	[-24.74]	[-31.30]	[-29.33]
Cash/Total Assets	0.003**	0.005**	0.002**	0.002**
	[2.01]	[3.16]	[1.41]	[1.33]
SG&A/Total Assets	0.002***	0.008***	0.002***	0.002***
	[3.70]	[3.62]	[3.00]	[2.82]
PP&E/Total Assets	-0.001	-0.002	-0.001	-0.001
	[-1.53]	[-0.56]	[-0.95]	[-1.09]
Acquisition Expense	-0.046***	-0.069***	-0.044***	-0.043***
	[-14.93]	[-8.01]	[-13.01]	[-12.47]
Retained Earnings/TA	-0.043***	-0.099***	-0.037***	-0.036***
	[-5.61]	[-2.63]	[-3.66]	[-3.44]
Taxes/Total Assets	0.047***	0.041***	0.049***	0.040***
	[6.68]	[5.64]	[4.63]	[4.58]
Constant	-0.119***	-0.015	-0.141***	-0.124***
	[-5.61]	[-1.06]	[-5.81]	[-5.07]
Year Dummies	YES	YES	YES	YES
Quarter Dummies	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES
Observations	195,714	49,022	146,692	135,512
R-Squared	0.022	0.033	0.021	0.020

Table VII: Firm Investment And Aggregate Stock Market Size

See appendix I for variable definitions. T-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Heteroskedasticity robust standard errors are used in all regressions. Dependent variables are shown along the top horizontal row, while independent variables appear on the far right column. The basic specification in this table is:

Δ Firm Investment = β_0 + β_1*Firm Count + β_2*ln Assets + β_3*Leverage + β_4*Cash/Total Assets + β_5*SG&A/Total Assets + β_6*PP&E/Total Assets+ β_7*Acquisition Expense + β_8*Retained Earnings/Total Assets + β_9*Taxes/Total Assets + β_i*Quarter Dummies + Firm FEs + ε

	All Years	Pre-2000	Post-1999	Post-1999 excl 2008
VARIABLES	(1) Firm Investment	(2) Firm Investment	(3) Firm Investment	(4) Firm Investment
Firm Count	0.046***	0.002	0.049***	0.050***
	[3.50]	[0.20]	[3.18]	[3.26]
ln_Assets	-1.898***	-0.616*	-2.577***	-2.638***
	[-5.27]	[-1.83]	[-6.65]	[-6.78]
Leverage	0.602**	1.098***	1.205**	1.126**
	[2.15]	[4.14]	[6.96]	[6.35]
Cash/Total Assets	-0.011**	-0.006*	-0.026**	-0.034**
	[-8.89]	[-1.64]	[-6.25]	[-7.47]
SG&A/Total Assets	-0.217***	-0.295***	-0.236***	-0.223***
	[-10.78]	[-9.58]	[-7.24]	[-7.02]
PP&E/Total Assets	-0.007***	-0.047***	-0.003	-0.003
	[-7.51]	[-27.34]	[-1.31]	[-1.11]
Acquisition Expense	0.209***	0.323***	0.258***	0.267***
	[15.02]	[13.69]	[14.55]	[14.08]
Retained Earnings/TA	0.203***	-0.029***	0.543***	0.512***
	[6.35]	[-5.22]	[7.22]	[6.83]
Taxes/Total Assets	-0.499***	-0.042**	-0.559***	-0.520***
	[9.92]	[2.10]	[11.52]	[11.09]
Constant	61.48***	76.36***	149.29***	91.64***
	[5.42]	[5.79]	[8.54]	[7.23]
Year Dummies	YES	YES	YES	YES
Quarter Dummies	YES	YES	YES	YES
Firm Fixed Effects	YES	YES	YES	YES
Observations	195,714	49,022	146,692	135,512
R-Squared	0.172	0.153	0.194	0.187

Table VIII: HHI of Industry Concentration With 2SLS

See appendix I for variable definitions. T-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Dependent variables are shown along the top horizontal row, while independent variables appear on the far right column. The basic specification in this table is:

2SLS Estimation		
	First-Stage	Second-Stage
Dependent variable:	Firm Count	Profit Growth
	(1)	(2)
Industry HHI	0.306***	
	(4.71)	
Firm Count		0.134**
		(2.01)
Other Controls	Yes	Yes
Quarter Dummies	Yes	Yes
Year fixed effects	Yes	Yes
1st stage F-statistic (*p*-value)		0.000
Hansen *J*-statistic		1.285
χ^2 *p*-value		0.237

Table IX: Lagged Firm Count As An Instrumental Variable

See appendix I for variable definitions. T-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Heteroskedasticity robust standard errors are used in all regressions. Dependent variables are shown along the top horizontal row, while independent variables appear on the far right column. The basic specification in this table is:

LHS Variable = β_0 + β_1*Lagged Firm Count + β_2*ln Assets + β_3*Leverage + β_4*Cash/Total Assets + β_5*SG&A/Total Assets + β_6*PP&E/Total Assets+ β_7*Acquisition Expense + β_8*Retained Earnings/Total Assets + β_9*Taxes/Total Assets + β_i*Quarter Dummies + Firm FEs + ε

	All Years	All Years	All Years	All Years
VARIABLES	(1) Profit Growth	(2) Revenue Growth	(3) Altman Z	(4) Investment Change
Firm Count$_{t-4}$	0.042***	0.095***	-0.021**	0.043***
	[5.82]	[2.73]	[-2.05]	[3.16]
Other Controls	YES	YES	YES	YES
Quarter Dummies	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

Table X: D-I-D for Affected vs. Unaffected Industries Around Exchange Shrinkage
See appendix I for variable definitions. T-statistics are shown in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively. Heteroskedasticity robust standard errors are used in all regressions. In column 1, the table uses dependent variables equal to the following:

D-I-D Profit Growth = (Profit Growth of Industry i – Profit Growth of Industry j)$_t$ – (Profit Growth of Industry i – Profit Growth of Industry j)$_{t-4}$

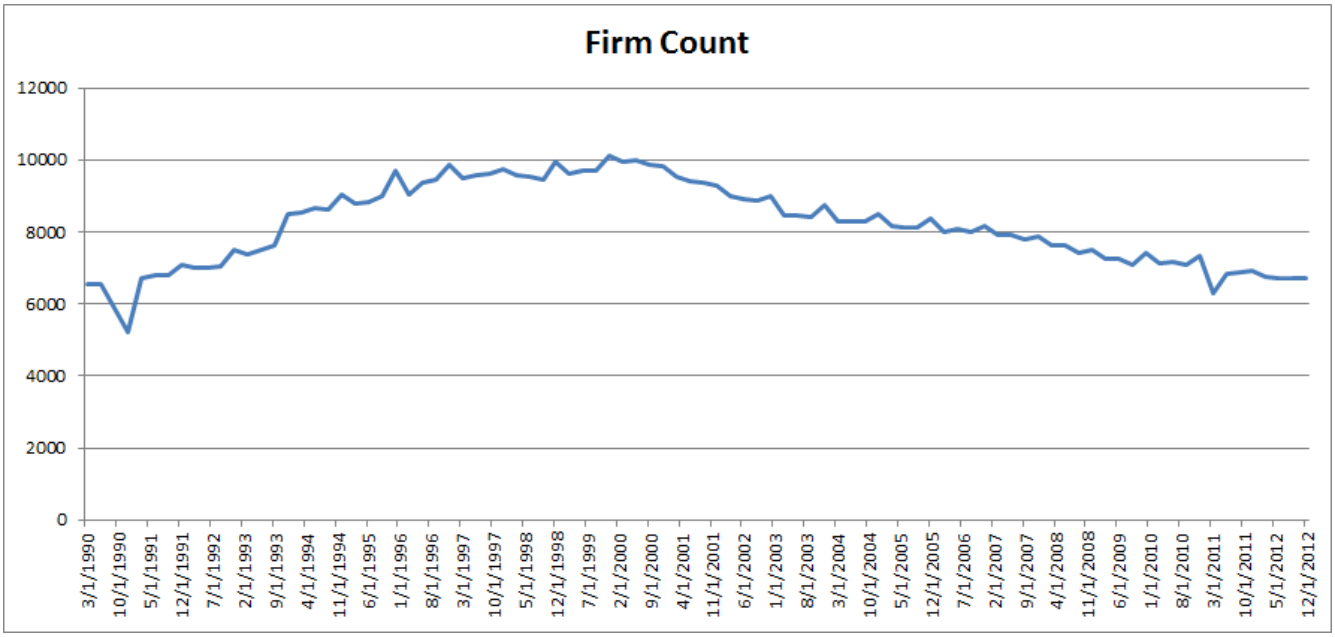
Here *Industry i* is a four-digit SIC denominated industry for the firm during quarter t. Industry j is a propensity score matched industry with no firm shrinkage in quarter t.[20] Each regression uses a dummy variable equal to 1 if *Industry i* shrinks by at least one firm during quarter t. Thus the specification captures the change in differences between propensity score matched industry profit growth rates for two industries; one that is seeing a declining firm count, and the other which is not. A similar approach is used in columns 2 through 4.

DID LHS Variable = β_0 + β_1*Shrinkage Dummy + β_2*ln Assets + β_3*Leverage + β_4*Cash/Total Assets + β_5*SG&A/Total Assets + β_6*PP&E/Total Assets+ β_7*Acquisition Expense + β_8*Retained Earnings/Total Assets + β_9*Taxes/Total Assets + β_i*Quarter Dummies + Firm FEs + ε

	All Years	Pre-2000	Post-1999	Post-1999 excl 2008
	(1)	(2)	(3)	(4)
VARIABLES	DID - Profit Growth	DID - Revenue Growth	DID - Altman Z	DID - Investment Change
Shrinkage	-0.169***	-0.208***	0.083***	-0.115***
	[-5.03]	[-4.29]	[3.36]	[-4.90]
Other Variables	YES	YES	YES	YES
Quarter Dummies	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES

[20] Propensity score matching is based on the control variables used in tables above along with the previous year's profit growth rate (i.e. t-8 to t-5).

Figure 1: The number of publicly traded stocks on the NYSE, AmEx, and NASDAQ over time



Appendix I: Variable Definitions

Variable	Description	Data Source
Acquisition Expenses	Quarterly expenses on acquisition at each firm	Compustat
Altman Z	Standard Altman Z calculation performed as follows: Z = 1.2T1 + 1.4T2 + 3.3T3 + 0.6T4 + 0.99T5. T1 = Working Capital / Total Assets. T2 = Retained Earnings / Total Assets. T3 = Earnings Before Interest and Taxes / T4 = Market Value of Equity / Book Value of Total Liabilities. T5 = Sales/ Total Assets.	Calculated
Cash	Quarterly cash and cash equivalents at each firm	Compustat
Dividends	Quarterly total cash dividend paid at each firm	Calculated
Firm Count	Number of firms on US exchanges at the end of a given quarter.	Compustat
Invested Capital	Quarterly total invested capital at each firm	Compustat
PP&E	Quarterly total plant, property, and equipment expenditure at each firm	Compustat
Profit Growth	Year-over-year growth in net income in a given quarter	Calculated
Retained Earnings	Quarterly retained earnings at each firm	Compustat
Revenue Growth	Year-over-year growth in total revenue in a given quarter	Calculated
SG&A	Quarterly selling, general, and administrative expenses at each firm	Compustat
Taxes	Quarterly total taxes paid by each firm based on that quarter's income	Compustat
Total Assets	End of quarter total assets at each firm	Compustat
Total Leverage	End of quarter total liabilities/equity at each firm	Compustat