Where Have All the IPOs Gone?

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Abstract

During 1980-2000, an average of 311 companies per year went public in the U.S. Since the technology bubble burst in 2000, the average has been only 102 initial public offerings (IPOs) per year, with the drop especially precipitous among small firms. Many have blamed the Sarbanes-Oxley Act of 2002 and the 2003 Global Settlement's effects on analyst coverage for the decline in IPO activity. We offer an alternative explanation. We posit that the advantages of selling out to a larger organization, which can speed a product to market and realize economies of scope, have increased relative to the benefits of operating as an independent firm. Consistent with this hypothesis, we document that small company IPOs have had declining profitability, consistently low returns for public market investors, and an increasing likelihood of being involved in acquisitions.

Key Words: IPO volume; trade sales; economies of scope; effects of Sarbanes-Oxley; VC exits

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1. Introduction

The number of initial public offerings (IPOs) in the U.S. dropped from an average of 311 IPOs per year during 1980-2000 to only 102 IPOs per year during 2001-2009. The low level of IPOs this decade has generated much discussion among private company executives, stock exchange officials, policy-makers, and the financial press, as well as among venture capitalists and buyout firms that depend on an active IPO market for exits. Commentators have expressed concern that the lack of a vibrant IPO market could limit Gross Domestic Product (GDP) and employment growth (e.g., Weild and Kim (2009)). Delaware Governor Jack Markell, writing in the *Wall Street Journal* (2012), states "By some estimates, including a study prepared by Grant Thornton LLP, the U.S. has lost more than 10 million jobs because of lost IPOs since the 1990s." The U.S. Treasury impaneled a task force to examine policy options for generating more IPOs by U.S. companies.[1] Congress has passed bi-partisan legislation to generate more IPOs, the Jumpstart Our Business Startups (JOBS) Act.[2]

Two main explanations for the prolonged drought in IPOs have been advanced. First, the Sarbanes-Oxley Act of 2002 (SOX), particularly Section 404, imposed additional compliance costs on publicly traded firms. As a percentage of revenue, these costs have been especially onerous for small firms. Consistent with the SOX explanation for the decline in IPO activity, the decline in IPOs has been most pronounced among small firms.

[1] Kate Mitchell, a managing partner at Scale Venture Partners and former chair of the National Venture Capital Association, headed the IPO Task Force that made recommendations to the U.S. Senate Banking Committee on what should be done to resurrect the U.S. IPO market on December 14, 2011.
[2] President Barack Obama is scheduled to sign this bill on April 5, 2012.

Second, others have attributed the drop in small company IPO volume in the U.S. to a decline in the "ecosystem" of underwriters that focus on smaller firms and provide analyst coverage after a company has gone public. Explanations for the decline include the effects of the drop in bid-ask spreads associated with decimalization in 2001, as well as the U.S. Securities and Exchange Commission's (SEC) Regulation FD (Fair Disclosure) in 2000 and the 2003 Global Settlement (see Weild and Kim (2008, 2009), as discussed in Zweig (2010) and Weild (2011)).[3] This explanation asserts that the decline in bid-ask spreads and other regulatory changes have reduced the incentive of market makers to have affiliated analysts cover a stock. This analyst coverage explanation assumes that small company valuation ratios (e.g., price-to-earnings and market-to-book ratios) are higher if there is more analyst coverage (and especially if there is favorable analyst coverage), decreasing the cost of equity capital from public markets. Consistent with the lack of analyst coverage explanation, Jegadeesh and Kim (2010, Table 1) report that both the number of firms covered and the number of sell-side analysts peaked in 2002 and then declined.

We term the above explanations the *regulatory overreach hypothesis*. All of the above explanations for the low volume of IPOs since 2000 can be summarized as being variants of "the IPO market is broken." Although we do not argue that nothing is wrong with the IPO market, our explanation for the dearth of IPOs in the last decade is fundamentally different.

In this paper, we introduce a new explanation for the prolonged low level of U.S. IPO volume, which we term the *economies of scope hypothesis*. We posit that there is an on-going change in the economy that has reduced the profitability of small companies, whether public or private. Our analysis is based on the technological determinants of the optimal scale of the firm

[3] In a 2009 survey, SOX, Corporate Governance, and Reg FD were listed as among the top 3 compliance challenges for small companies thinking of going public. This survey is conducted by venture capital firm DCM and these results are included in the March 2011 presentation of National Venture Capital Association Chair Kate Mitchell at the U.S. Treasury Access to Capital conference.

in a dynamic environment, where profitable growth opportunities may be lost if they are not quickly seized. We contend that many small firms can create greater operating profits by selling out in a trade sale (being acquired by a firm in the same or a related industry) rather than operating as an independent firm. Earnings will be higher as part of a larger organization that can realize economies of scope and bring new technology to market faster.[4]

Both the regulatory overreach and the economies of scope hypotheses attribute the drop in the number of small company IPOs to low public market prices relative to their valuations in a trade sale. The conventional wisdom, however, states that the low public market price is due to either a lower valuation caused by the lack of analyst coverage, or to lower earnings as a public firm because of SOX and other costs. In contrast, our explanation is that earnings are higher as part of a larger organization that can realize economies of scope and economies of scale, and this feature is the main reason why many small firms are choosing not to remain independent, but instead merging as a way of getting big fast. If our explanation is correct, regulatory reforms aimed at restoring the IPO ecosystem will have only a modest ability to affect IPO volume.

We present numerous facts that are consistent with our economies of scope hypothesis and inconsistent with the regulatory overreach hypothesis. Following concerns that the implementation of SOX, especially Section 404, was imposing excessive costs on small public companies, in June 2007 the SEC revised some of the rules, lessening the burdens on small companies.[5] Inconsistent with the regulatory overreach hypothesis, the number of small company IPOs has not increased since then.

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[4] Economies of scope exist when the average cost of production, including marketing and distribution costs, are lower when related products are produced as part of a larger organization than when produced by independent organizations. For example, a pharmaceutical company that sells two types of antibiotics is likely to have lower costs per unit than if two independent companies each sold one antibiotic.

[5] The U.S. SEC released its interpretive guidance on June 27, 2007, and the Public Company Accounting Oversight Board approved Auditing Standard No. 5 for public accounting firms on July 25, 2007. On September 15, 2010, the SEC issued final rule 33-9142, which permanently exempts registrants that are neither accelerated nor large accelerated filers from the Section 404(b) internal controls audit requirement.

We show that the drop in IPO volume has been concentrated among small firms, a pattern that has been widely noted. We report that among small firm IPOs, the percentage that are unprofitable in the three years after going public has increased from 58% in 1980-2000 to 73% in 2001-2009. In contrast, for large company IPOs there has been no downtrend in post-IPO profitability. We also analyze the profitability of small and large Compustat-listed companies that have been public for more than three years, and construct a "what-if" measure of profitability by excluding SOX-related costs from expenses. We find that the pattern of low profitability for small firms persists.

Of companies that do go public in the U.S., we report that there has been no drop in analyst coverage. Furthermore, we present evidence that for the last three decades the long-run returns earned by investors on small company IPOs have been poor, with the relative performance of small company IPOs particularly disappointing after 2000. Taken together, these patterns suggest that while SOX and the combined effects of decimalization and the Global Settlement on analyst coverage may have had some effect on small company IPOs, the more fundamental problems are the absence of profitable small companies and the absence of small companies that grow and become highly profitable, earning high returns for investors.

Inconsistent with the regulatory overreach hypothesis, relatively few U.S. firms have chosen to go public abroad (Caglio, Hanley, and Marietta-Westberg (2011, Table III)), and foreign listings have not been disproportionately affected (Doidge, Karolyi, and Stulz (2009, Table 7)). The volume of IPOs in many other developed countries, especially in Germany and France, has also been quite modest after 2000.[6]

[6] Vismara, Paleari, and Ritter (2012, Table 2) report that an average of 79 IPOs per year occurred on the main markets of London, Paris, Milan, and Frankfurt combined during 1995-2000. During 2001-2009, this aggregate annual average for the four largest economies in Europe fell to 41 IPOs per year, in spite of the inclusion of IPOs starting in January 2005 from Belgium, the Netherlands, and Portugal after the Paris Bourse merged with these markets to create Euronext.

Furthermore, for the firms that do go public, the fraction that are acquired or make acquisitions within a few years of going public has increased over time. Increasingly, recent IPOs do not rely exclusively on organic (internal) growth to expand. Of those that are acquired, we show that most are acquired by other publicly traded companies, and there has been no increase in the fraction of acquisitions by private companies or buyout firms. In other words, recent IPOs that voluntarily delist are not going private as a stand-alone company in an attempt to avoid SOX costs, nor do they delist because of insufficient analyst coverage. These patterns are consistent with the economies of scope hypothesis and inconsistent with the regulatory overreach hypothesis.

Our hypothesis that economies of scope and speeding products to market have become more important over time suggests a gradual decrease in the number of small company IPOs, rather than the abrupt and, to date, permanent decline that occurred when the tech stock bubble collapsed after March of 2000. To control for other determinants of IPO volume, we test our explanation for the decline in IPO volume in a regression framework with the quarterly volume of IPOs scaled by real GDP as the dependent variable. Explanatory variables include a time trend, reflecting the increasing importance of economies of scope, and a dummy variable for the post-SOX era, while controlling for business conditions, the profitability of small firms, the market-to-book ratio of small firms, and lagged and future returns on the Nasdaq index. Our economies of scope hypothesis predicts a negative coefficient for the time trend variable. At the same time, the regulatory overreach hypothesis predicts a negative coefficient for the SOX dummy variable.

There are two key empirical findings. First, we obtain a negative and statistically significant coefficient for the time trend, supporting our economies of scope hypothesis. Furthermore, there is a stronger downtrend for small firm IPOs than for large firm IPOs. In contrast, the coefficient

on the SOX dummy variable is close to zero and statistically insignificant in all of our specifications.

To the best of our knowledge, our economies of scope hypothesis offers a completely new explanation for the drop in U.S. IPO activity after 2000. Perhaps the closest related paper is by Bayar and Chemmanur (2011), which models the choice of going public as a tradeoff between an entrepreneur retaining the private benefits of control by staying private versus realizing higher wealth due to economies of scale and scope from the IPO proceeds. Our analysis goes a step further, and hinges on the argument that by selling out rather than going public, the firm is able to achieve even greater economies of scale and scope. Because we are interested in explaining the time series rather than the cross section of IPO activity, we do not focus on private benefits of control, since we are not aware of any reason to think that they have changed over time.

2. The Decline in U.S. IPO Activity

Table 1 and Figure 1 show the number of companies going public in the U.S. by year during 1980-2009. Most of our analysis covers IPOs from this 30 year period, although occasionally we include data from 2010 and 2011 (Figure 1) or, due to the availability of data, start with a different year than 1980. In most of our tables, we end with IPOs from 2009 because we use post-IPO accounting or analyst coverage information. Throughout, we restrict our definition of IPOs to exclude non-operating companies, thus excluding closed-end funds, REITs, and special purpose acquisition companies (SPACs). Furthermore, we screen out IPOs with an offer price lower than $5 per share, unit offers, small best efforts offers, bank and S&L IPOs, limited partnerships, and companies not listed on CRSP within six months of the IPO date. Finally, we screen out foreign company IPOs that use American Depositary Receipts (ADRs), except in Table 6 when we show that the percentage of IPOs from foreign issuers has increased over time.

Table 1 and Figure 1 show that the number of IPOs each year after 2000 has been low by the standards of the 1980s and 1990s. The average annual volume of operating company IPOs fell from 311 during 1980-2000 to only 102 during 2001-2009 (and an average of only 99 if we include 2010 and 2011). The low volume of IPOs in the last decade is even more pronounced when one takes into account the 117% increase in real GDP during our sample period. The decline in IPO activity has been particularly noteworthy for small firms (those with pre-issue annual sales of less than $50 million, expressed in 2009 purchasing power), with average small company volume declining from 165 IPOs per year in 1980-2000 to 30 IPOs per year in 2001-2009.[7]

The market has also witnessed a decline in large company IPOs, from an annual average of 146 IPOs in 1980-2000 to 72 IPOs in 2001-2009. The average annual IPO volume during 2001-2009 is significantly lower than the 1980-2000 average at the 1% level, as is the drop in small company volume relative to the drop in large company volume. At the same time, when annual volume is measured using total gross proceeds (expressed in 2009 purchasing power, as shown in the right-most column of Table 1), a structural shift is not apparent, since the small company deals carry less weight.

We focus on this low-frequency change in the volume of IPOs, especially the volume of small company IPOs, in contrast to papers that attempt to explain the variations in monthly, quarterly, or yearly volume, such as Lerner (1994), Lowry and Schwert (2002), Lowry (2003), Helwege and Liang (2004), and Rau and Stouraitis (2011). We now proceed to document a number of patterns consistent with our economies of scope hypothesis.

[7] Pre-IPO sales and earnings per share (EPS) numbers come from the Thomson Reuters new issues database, but we make hundreds of corrections and inclusions of missing data items. The main sources of the additional information are the U.S. SEC's online EDGAR database (Prospectuses are SEC Form 424 filings) for IPOs after mid-1996, and the Graeme Howard/Todd Huxster collection of IPO prospectuses for 1975-1996 for earlier years. The Graeme Howard/Todd Huxster set of prospectuses is also used for post-1996 foreign firms, since in the late 1990s Form F-1 prospectus filings were not filed electronically.

3. The Profitability of Small and Large Firms

3.1 The profitability of publicly traded small and large firms over time

In Table 2, we report the percentage of publicly traded firms with negative EPS each year from 1980-2009. We report this percentage for small and large company IPOs (columns 2 and 4) from the prior three years, and small and large seasoned firms (columns 6 and 8), which we define as firms that have been CRSP-listed for at least three years. We define small and large IPO firms using a cutoff of $50 million (2009 purchasing power) in pre-IPO last twelve month (LTM) sales. For seasoned firms, we define small and large firms using a cutoff of $250 million (2009 purchasing power) in annual sales. Our rationale for using different cutoffs for recent IPOs and for seasoned firms is that most IPOs are rapidly growing at the time of the IPO, and many companies that had less than $50 million in sales in the year before going public grow in the years after the IPO to exceed this threshold. Restricting the definition of seasoned firms to a $50 million annual sales cutoff would result in a relatively tiny sample of small seasoned firms, partly consisting of seasoned "loser" firms. Our qualitative conclusions, however, are not sensitive to the exact cutoffs.

Column 2 of Table 2 shows a dramatic decline in the post-issue profitability of recent small company IPOs over time. In every fiscal year from 1980-1991, less than 50% of small company IPOs from the previous three years were unprofitable. By contrast, in every single year since then, more than 50% of small company IPOs from the prior three years have been unprofitable. In comparison, column 4 of Table 2 shows a modest decline over time in the post-IPO profitability of large company IPOs.

Column 8 of Table 2 shows that among large seasoned firms, the percentage of companies with negative EPS has increased over time, from an average of 13% over 1980-1991 to an

average of 18% over 1992-2009. Inspection of the numbers shows that, in addition to a long-term trend, business cycle effects are also present, with fewer profitable firms during recessions. The decline in profitability of small firms (column 6) is stronger than the decline for large firms (column 8), with roughly 30% of small public firms being unprofitable early in the sample period and 40-50% being unprofitable in most years since then. The relatively stable, although low, profitability of seasoned small firms is in spite of the fact that there are fewer of them now than in the 1990s, as shown in column 5 of Table 2.

Our results are in line with Fama and French (2004, Table 4 and Figure 3), who also report a corresponding decline in the fraction of both public firms and recent IPOs with positive earnings during their 1973-2001 sample period. Likewise, DeAngelo, DeAngelo, and Skinner (2004, Table 6) document that the biggest firms generate a much higher proportion of aggregate earnings in 2000 than in 1978. They emphasize that the largest firms have been gaining a higher fraction of aggregate profits, consistent with our explanation for why fewer small private firms are choosing to remain independent by going public, rather than selling out in a trade sale.

Why has small firm profitability declined? Our contention is that large firms have become more profitable over time because they can realize economies of scope, speed products to market, and realize economies of scale in information technology.

To illustrate this logic with an example, according to its SEC Form 10-K, Apple, Inc. had 49,400 full time employees in September 2010, and thus was able to assign a veritable army of engineers to rapidly implement new technologies into its consumer electronics products, such as the iPad, iPod, and iPhone. In turn, the production of these products is largely outsourced to original equipment manufacturer Foxconn, a subsidiary of Taiwan's Hon Hai Precision Industry Co., Ltd, which employs hundreds of thousands of workers worldwide. No small independent company could implement new technology so rapidly and sell tens of millions of units to

consumers in a matter of months. Instead, we posit that a small private company that develops valuable new technology for consumer electronics would find that its value-maximizing strategy is to sell out to Apple or another consumer electronics firm rather than go public itself.

Two pieces of evidence support our contention that the speed of technological innovation has increased, to the benefit of larger firms. First, both Sorescu, Chandy, and Prabhu (2003, Table 5) and Sood and Tellis (2005, p. 161) document that in recent years, most new technologies have been introduced by large firms. Second, Sood and Tellis suggest that the pace of technological change has increased over time, placing small firms at a disadvantage because they lack the resources to quickly take advantage of new technology.

Another related explanation for the decline in small firm profitability after 1995 is that the internet has made comparison shopping easier for consumers, as argued by Goldmanis, Hortacsu, Syverson, and Emre (2010). With reduced search costs, there is more of a "winner take all" tendency. Thus, in some sectors, the profit-maximizing size of firms has increased, and the number of firms with positive economic profits has decreased. Increased speed of communication thus leads to both a greater advantage from implementing new technology quickly, and a greater opportunity cost of waiting. For a small firm to grow organically, it would have to devote resources to hiring employees, developing markets, etc. A larger company might be able to quickly redeploy existing employees and use its existing marketing network to develop profitable markets more quickly.[8]

3.2 Post-IPO profitability categorized by industry

Given that the industry composition of IPOs changes over time, how robust are the patterns documented in Table 2? In Table 3, we categorize IPOs by the pre-issue sales and time period,

[8] Another possible reason for the decline in profitability, especially for small firms and recent IPOs, is the change in the accounting for employee stock option expenses. FAS123r became effective for fiscal years beginning after June 15, 2005 for large firms and after December 15, 2005 for small firms. We have not investigated the impact of this accounting change on reported earnings.

and report the fraction of IPO firm fiscal years with negative EPS in the three fiscal years after the IPO. In other words, Table 3 sorts firms by IPO year cohort, whereas Table 2 sorted by fiscal years. As we do throughout the paper, we classify small and large company IPOs using $50 million in inflation-adjusted (2009 purchasing power) pre-IPO annual revenue as the cutoff, irrespective of how much money was raised in the IPO and irrespective of the equity market capitalization. For each IPO going public in calendar year t, we then search for the EPS numbers for the first three fiscal years after the IPO, conditional on the first fiscal year ending more than six months after the IPO.[9] We then tabulate the number of fiscal years with either negative or nonnegative EPS.

In Table 3, we report subperiod results for the percentage of fiscal years with negative EPS for the IPOs from each cohort. For example, for the 73 IPOs from 1980, there are theoretically as many as 3×73=219 post-IPO fiscal years, although in practice there are only 200 due to missing Compustat data and early delistings. Of the available fiscal years for the 1980-2000 IPO cohorts, 58% of small company IPOs and 23% of large company IPOs have negative EPS. In 2001-2009, 73% of these post-IPO fiscal years are unprofitable for small companies, whereas only 24% of post-IPO fiscal years are unprofitable for large companies.

Additionally, we separately report the frequency of nonnegative and negative EPS for small and large company IPOs, for tech and biotech firms (Panel B of Table 3) and firms in all other industries (Panel C of Table 3). Inspection of the panels shows that the declining profitability of small company IPOs is not entirely driven by tech and biotech firms. The non-tech firms in Panel

[9] Our purpose is to show profitability after the IPO, not including fiscal years that had the majority of the months prior to the IPO. For example, an IPO in March 1983 with a fiscal year ending in October 1983 would have fiscal 1983 as the first post-IPO fiscal year, but if the fiscal year ended in September, we would use fiscal 1984 as the first post-IPO fiscal year. More generally, if a company goes public in 1983, the first post-IPO fiscal year could be fiscal 1983, 1984, or 1985, with the latter being the case for a November 1983 IPO with a fiscal year ending in January through April. If the first post-IPO fiscal year is 1985, we use 1985 EPSPX (earnings per share before extraordinary items). If the Compustat EPSPX number for fiscal 1985 is not available, we use the available EPSPX number in 1984, or 1983, or the EPS12 (LTM EPS prior to the IPO) number from Jay Ritter's database, in decreasing order.

C show a smaller, but still downward, trend in profitability.

Overall, we conclude that small company IPOs exhibit declining profitability for both of these broadly defined industry groupings.

4. Small Company IPOs Underperform in the Long Run

The preceding analysis has documented a decline over time in the profitability of small firms conducting IPOs. We now turn to the post-issue stock return performance of small and large company IPOs, and link it to the economies of scope and regulatory overreach hypotheses.

Table 4 tabulates the first-day return and three alternative measures of the three-year buy-and-hold returns after the IPO issue date for all IPOs, small company IPOs, and large company IPOs. Three-year buy-and-hold returns are measured from the closing market price on the first day of trading until the earlier of either their three-year anniversary or their delisting date. The buy-and-hold abnormal return $BHAR_{i,T}$ for stock i over horizon T is measured both with respect to the CRSP value-weighted index (market-adjusted), and with respect to a seasoned stock that is matched on the basis of market capitalization and its book-to-market ratio (style matching):

$$BHAR_{i,T} = \prod_{t=1}^{\min(T,\,\text{delist})} (1+R_{i,t}) - \prod_{t=1}^{\min(T,\,\text{delist})} (1+R_{M,t}), \qquad (1)$$

where $R_{i,t}$ is the net return in period t on stock i and $R_{i,t}$ is the net return in period t on either the value-weighted market or the style-matched seasoned firm. In addition to reporting the equally weighted unconditional returns in the top row of Table 4, we also categorize IPOs by the pre-issue sales of the firm and by subperiod.

Inspection of the bottom two rows of Table 4 shows that small company IPOs have underperformed relative to their style-matched benchmark by an average of 17.3% during the

three years after going public, whereas large company IPOs have outperformed their style-matched benchmark by 2.6% during the three years after going public. Furthermore, small company IPOs have underperformed their style-matched benchmark in every subperiod. The underperformance relative to the value-weighted market benchmark is even more severe for the small companies, and is also present in every subperiod.

Even though there have been relatively few small company IPOs during the 2001-2009 period, they have nevertheless underperformed, by an average of 30.2% on a style-adjusted basis. Furthermore, small company IPOs have lower average first-day returns than large company IPOs during 2001-2009, reversing the historical relation. In sum, small company IPOs continued to yield inferior returns for their investors in 2001-2009.

The poor long-run performance of small company IPOs, in principle, could be consistent with both the regulatory overreach hypothesis and the economies of scope hypothesis. If a drop in analyst coverage and SOX compliance costs were unanticipated, companies that were already public when these changes occurred would see low returns as investors incorporated the effects into market prices. Table 4, however, reveals low returns on recent small company IPOs in all subperiods over our 30 year sample period.

The economies of scope hypothesis asserts that technological change has put increasing pressure on the profitability of small firms over a prolonged period of time. The declining profitability of small firms would result in low returns for investors, however, only if the decline in profitability was unanticipated. Irrespective of the cause of the low realized returns on small company IPOs, the low post-issue returns inevitably would dampen investor enthusiasm for small company IPOs, resulting in lower volume.

5. Analyst Coverage Following IPOs

In Sections 3 and 4, we have documented the poor post-IPO operating performance and low stock returns on small company IPOs. We now examine the validity of one of the arguments underlying the regulatory overreach hypothesis by presenting evidence on analyst coverage following IPOs. As previously discussed, many commentators have argued that a decline in analyst coverage on small companies has deterred small companies from going public.

The IPO ecosystem explanation for the decline of small company IPOs argues that more than just the number of analysts has declined. Independent boutique investment banks such as L.F. Rothschild, Hambrecht & Quist, Robertson Stephens, and Alex. Brown, which were known as the "Four Horsemen" in the 1980s, have disappeared. These underwriters, and Montgomery Securities in the 1990s, took public many firms in the 1980s and 1990s. In the late 1990s, commercial banks seeking to expand into equity underwriting acquired almost all of the surviving boutiques, but these banks have not taken public as many small company IPOs per year, especially for technology companies. Proponents of the ecosystem explanation argue that small companies now have more difficulty finding a reputable underwriter than had previously been the case.

Post-issue analyst coverage affects IPO volume if on average analyst coverage boosts a company's share price, lowering the required return as a public company relative to the required return if the company continued to be private or was part of a larger corporation. This boost in the share price would be reflected, everything else the same, in a higher market-to-book ratio and, for companies with positive EPS, a higher price-to-earnings ratio. There is evidence from previous event studies showing positive stock market reactions to unexpected initiations of coverage and upgrades, and negative stock market reactions to unexpected cessation of coverage or downgrades, suggesting that analyst coverage does indeed boost the share price of a stock, at

least temporarily (see, e.g., Womack (1996, Table III), Barber, Lehavy, McNichols, and Trueman (2001, p. 540), Irvine (2003, Table 1), Bradley, Jordan, and Ritter (2008, Table 3), and Demiroglu and Ryngaert (2010, Table IV)).

In Table 5, we report the frequency of analyst coverage following IPOs. The main source for analyst coverage data is the Institutional Brokers' Estimate System (I/B/E/S) analyst recommendation database (August 2010 download). Since I/B/E/S recommendation data started during 1993, the usable IPO sample in Table 5 is from 1994 to 2009. We augment the one year post-IPO lead underwriter analyst coverage data with data from Briefing.com, First Call, Investext, and Google Search, as well as some hand-collected Goldman Sachs analyst reports from 1996 to 2000. For IPOs with no evidence of recommendations in a year, we augment the dataset by examining the I/B/E/S earnings forecast database. If there is an earnings forecast, we assume that the analyst making the forecast also covers the stock.[10] We restrict the sample to 3,682 IPOs with a midpoint of the original file price range no lower than $8. Practitioners suggest that if an IPO has a lower than $8 midpoint value, there is usually little demand from institutional investors. Most of the 389 IPOs with a file price range midpoint of less than $8 are underwritten by low-prestige underwriters and frequently have no reported analyst coverage.

Table 5 reports four analyst coverage ratios for small and large company IPOs. For instance, in column 2, we report the by year the percentage of firms that have at least one analyst report from a lead underwriter by the end of the first anniversary of the IPO date. Columns 3, 4, and 5 report the percentage of firms that have at least one analyst report from any sell-side analyst within the first, second, and third year since the IPO date, respectively. The coverage ratio in the second and third year is calculated conditional on the firm still being CRSP-listed at the start of

[10] This assumption is based upon talks with the former head of technology research at a bulge bracket investment bank, Steve Balog, who said that he had never heard of an analyst making a formal EPS forecast on a company that the analyst did not cover.

the respective year. The overall time series pattern in Table 5 suggests that there is little change in the propensity to receive analyst coverage over time.

The relatively lower coverage ratios observed in 1994 and 1995 are more likely due to incomplete data in I/B/E/S rather than a lack of analyst coverage in the earlier years. During 1994-2000, an (unreported) average of 96.6% of small company and an average of 96.8% of large company IPOs received coverage from at least one lead underwriter in the first year. During 2001-2009, the respective averages are virtually identical at 95.3% of small company IPOs and 97.8% of large company IPOs. There is close to universal post-IPO coverage by at least one analyst affiliated with a lead underwriter. Importantly, these patterns are inconsistent with the argument in Weild and Kim (2008) that the drop in analyst coverage on small firms has caused the near disappearance of small company IPOs. Of course, there is a selection bias issue—we do not observe the companies that didn't go public because no underwriter would commit to providing analyst coverage.

Lastly, it is worth noting that for almost all cohorts, a lower percentage of the surviving IPOs are covered in year 2 than year 1, and in year 3 than in year 2. Partly this reflects a pattern that as a company becomes more seasoned, it is either succeeding and thus generating interest from institutional investors (and thus sell-side analysts), or it is failing and generating less interest from institutional investors and analysts. In general, both the probability of adding additional analysts covering the firm and the probability of becoming an "orphan" with no coverage grows. Most importantly, for year 3 analyst coverage, there is no evidence of a downtrend in column 5 of Table 5 for either small company or large company IPOs, suggesting that of the companies that do go public, the risk of being abandoned by analysts within a few years of going public has not increased.

In sum, our empirical results indicate no decline in post-IPO analyst coverage.

Consequently, a lack of analyst coverage is not a plausible major cause of the decline in IPO volume.

6. Has Sarbanes-Oxley Driven Away IPOs?

This section assesses the impact of SOX on both U.S. IPOs as well as foreign IPOs, shedding further light on the relevance of the regulatory overreach hypothesis.

6.1 Are firms made worse off by Sarbanes-Oxley compliance costs?

Section 404 of SOX has received widespread criticism for imposing large costs on small public firms, and, since 2007, the SEC approved several delays to allow the smallest public firms to postpone their compliance with Section 404(b), before permanently exempting them on September 15, 2010 (SEC final rule #33-9142). The critics of SOX have rarely noted its purpose, however. Assume that investors require a 10% expected return, and that there are 100 stocks with, between them, $9,950 million in earnings and zero growth. Further assume that 99 of the stocks earn $100 million per year, and one earns $50 million per year but engages in accounting fraud and reports $100 million. Rational investors will value these stocks at an aggregate of $99.5 billion. In a rational market, investors will value each of these stocks at a price-to-earnings ratio of 9.95 rather than 10.00, with 99 of them being undervalued by $5 million each and one of them overvalued by $495 million.

If each of these companies could demonstrate that its earnings number was accurate at a cost of $400,000 per year, the 99 honest companies would do so and report profits of $99.6 million each ($100 million minus the compliance costs), and rational investors would value these companies at $996 million each rather than $995 million. Rational investors would realize that the one other company was not having its earnings certified, and would not value it at the average of the other companies.

With the assumptions above, 99% of companies are net beneficiaries of SOX because it has removed the bad apple from the barrel, allowing the good apples to get a higher price rather than a pooling price. If the cost of compliance was increased to $600,000, however, then all of the firms would receive a lower valuation because the pooling price is higher than the market price net of compliance costs. Depending on the costs of compliance and how many bad apples are removed from the barrel, the net effects can go either way. Furthermore, if there are fixed costs of compliance, the direct costs of compliance will be a higher proportion of profits for smaller firms, and unless the fraction of bad apples is sufficiently higher among small firms, the net benefits are likely to be lower for small companies than big companies. Iliev (2010, p. 1163) estimates the costs of compliance, and concludes that "On net, SOX compliance reduced the market value of small firms."

Since 2002, firms have had to pay SOX compliance costs. If the costs of complying with SOX are sufficiently onerous that small firms are on net made worse off, the decline in small company IPOs this decade can be partly attributed to SOX. In Figure 2, we plot the percentages of small and large seasoned firms with negative EPS, as reported in columns 6 and 8 of Table 2. As can be seen, the downtrend in small company profitability began before SOX.

Would there be more small firms with positive profits in the post-SOX period if SOX-related costs had not boosted the expenses of publicly traded companies? To address this question, we construct an alternative series of the percentage of profitable firms by assuming after-tax SOX compliance costs of $650,000 per small firm and $2,536,000 per big firm, dividing this number by the number of shares outstanding, and adding this back into EPS.[11] For

[11] Iliev (2010, p. 1166) uses a regression discontinuity approach and estimates that in 2004 small firms had additional pre-tax audit costs of $697,890. Table 13 of the SEC report reports mean compliance costs for firms with at least three years of experience complying with SOX Section 404 for two periods: pre- and post-Nov. 15, 2007 for three categories of firms: those with a public float of $50-150 million, $50-700 million, and greater than $700 million. The pre-tax pre- and post-2007 mean reported costs for small firms are $774,105 and $785,278. For the

example, a small firm with 10,000,000 shares outstanding would gain 6.5 cents per share if it didn't have this cost, and a big firm with 100,000,000 shares outstanding would gain 2.536 cents per share. In Figure 2, we then show, for 2002 and later, the percentage of small (and big) firms that would be profitable if they didn't incur the extra SOX costs.

We find the effect of paying the compliance cost on the profitability for small firms to be limited. Adding the compliance cost back removes between 43 and 76 small firms' EPS from the negative EPS category each year. This only removes about 4% to 5% of the small firms from the negative EPS group. The black dotted line of Figure 2 shows that without paying any SOX compliance costs, the firms' profitability would be improved. It would still be the case, however, that for the small seasoned firms, 40% or more of them would report negative EPS.

6.2 The effect of SOX on foreign listings

Many commentators have expressed concern over the decline in the relative importance of U.S. equity markets in the last decade. A recent *Wall Street Journal* article (Lucchetti, 2011), using data supplied by David Weild, stated that the number of operating companies listed on U.S. exchanges (Nasdaq, the NYSE, and the Amex) declined from a peak of 8,800 in 1997 to 5,000 in early 2011, while at the same time the number of listed stocks outside the U.S. more than doubled. The decline in U.S. listings, in an arithmetic sense, has occurred because the number of delistings has exceeded the number of new listings, primarily due to a dearth of IPOs. The article's explanations for the drop in listed companies focus on compliance costs, listing fees, and the U.S. litigation environment. Without providing an explanation of why, the article states that a larger proportion of VC-backed companies are selling out in trade sales rather than going public, as compared to the 1980s and 1990s, a pattern that is confirmed in our Figure 3.

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moderate-size firms, the mean reported costs are $1,168,319 and $1,082,814, respectively. For the large firms, the mean reported costs are $4,308,413 and $3,633,421, respectively. The $650,000 and $2,536,000 numbers that we use are weighted averages of, respectively, the pre-, post-, and next- means in Panel A for small firms, and Panels B and C for big firms, of Table 9 of the U.S. SEC (2009) report.

If SOX is an important reason for why companies, especially small companies, are not listing in the U.S., we might observe many U.S. companies going public abroad. In contrast, if U.S. companies are not going public because the advantage of being an independent firm has declined relative to becoming a part of a larger organization, then we would not see a substitution of U.S. companies going public in foreign markets rather than the U.S. Lucchetti (2011) states "In all, 74 U.S. companies have done IPOs in foreign countries since 2005, raising about $13.1 billion, according to Dealogic. That is a small fraction of the more than 650 U.S. companies that have gone public on U.S. exchanges since 2005." Of the $13.1 billion raised, $5 billion came from the March 2006 IPO of KKR Private Equity Investors Ltd. on Euronext, which transferred to the NYSE in 2008.

Further evidence that U.S. companies are not fleeing the U.S. to list in foreign markets is contained in Doidge, Karolyi, and Stulz (2009, 2011). While they document that the market share of the U.S., whether measured on the basis of the number of IPOs or the proceeds, has been falling, they do not detect evidence that many firms that would have listed in the U.S. pre-SOX are not doing so post-SOX.

In the 1990s, many large global IPOs were privatizations. In some countries, such as Australia and Japan, many of the IPOs in recent years have been of very tiny companies (e.g., a public float of $3 million). In London, main board listings have declined, although the number of offerings on London's Alternative Investment Market (AIM) was high before 2008. But most of the AIM IPOs are essentially private placements (1,572 out of 1,642 IPOs) that never develop liquid trading, and the aftermarket performance has been poor, with an average three-year buy-and-hold abnormal return of -27.5% (Vismara, Paleari, and Ritter, 2012, Tables 2 and 5).

Our hypothesis that small firms are not going public in the U.S. because the advantage of being a small independent firm has fallen applies to other countries as well. Consistent with this

hypothesis, Caglio, Hanley, and Marietta-Westberg (2011, Table X) report that both Germany and France saw their domestic IPO volume drop by at least 50% in 2002 to 2007 relative to 1994 to 2001. Furthermore, the average IPO proceeds in Germany and France more than doubled, indicating that both countries are losing small deals, similar to the U.S. pattern. In emerging markets, there have been more IPOs in the last decade because of the development of public equity markets.

In Table 6, we report the percentage of foreign companies, including those using ADRs, going public among U.S. IPOs each year from 1988-2011. Table 6 shows that the percentage of foreign IPOs in the U.S. has not declined this decade. The market share of foreign companies among U.S. IPOs has actually been increasing, partly due to the low number of U.S. companies going public. During 2001-2011, there has been an annual average of 23 foreign company IPOs, including 13 ADR IPOs.

To summarize, the evidence in our Table 6 and Doidge, Karolyi, and Stulz (2009, 2011) does not suggest that the lower number of IPOs in the U.S. in recent years is because either U.S. or foreign firms are fleeing U.S. markets in favor of foreign markets.

7. Evidence from Post-IPO Mergers

If our hypothesis that the value of small independent firms has declined relative to the value of larger firms is true, we would expect more private firms to sell out in trade sales and, for those companies that do go public, a higher propensity to be involved in a merger as either an acquirer or a target. If a lack of analyst coverage and high SOX compliance costs are instead the predominant reason for why being a small publicly traded firm has become less attractive, we would expect an increase in the last decade in the fraction of recent IPOs that subsequently go private. Alternatively, if being small is the issue, rather than being public, we would expect to see

an increase in the number of small companies selling out to strategic buyers.

Historically, venture capitalists have earned their biggest payoffs on portfolio companies that have gone public (Sahlman (1990), p. 482). In Figure 3, we show the annual number of exits of VC-backed portfolio companies by IPO (top figure) and by acquisitions (bottom figure), which we term trade sales, for 1998-2009. Figure 3 reveals that in 1998-2000, there were both many exits via IPOs and via trade sales. During 2001-2009, however, the annual number of trade sales has remained fairly constant, whereas the annual number of IPOs is much lower.

Panel A of Table 7 reports the number of companies that were delisted for non-distress reasons in the three years after going public for the IPO cohorts from 1980-2009. Of the 7,443 IPOs from these years, 911, or 12.2%, either went private or were acquired within three years of the IPO. Only 48 IPOs, or 0.6%, are involved in going private as a stand-alone company, and only 61, or 0.8%, sold out to a private strategic buyer. Importantly, there is no evidence that the propensity to go private either in a buyout or a trade sale increased in the last decade. By contrast, 799 of the 7,443 IPOs, or 10.7%, sold out to a publicly traded strategic buyer, and this percentage increased over time for small company IPOs, as shown in Panel B of Table 7.

Table 7 also shows that the percentage of IPOs that are acquired within three years of going public has increased over time. In 1980-1993, Panel A shows that there is only one IPO cohort for which *more* than 10% of the firms are subsequently acquired by a strategic buyer, whether public or private. In contrast, only two of the IPO cohorts from 1994-2009 have *less* than 10% of the firms subsequently acquired. Panel B shows that the increase in the probability of being acquired is restricted to small company IPOs.

Consistent with the economies of scope hypothesis, Brau and Fawcett (2006, Table II), in a survey of 336 companies that went public in 2000-2002, report that the single most important reason given for going public was an enhanced ability to make acquisitions. Arikan and Stulz

(2011), Brau, Francis, and Kohers (2003), Brau, Couch, and Sutton (2011), Celikyurt, Sevilir, and Shivdasani (2010), Chemmanur, He, He, and Nandy (2011), Hovakimian and Hutton (2010), and Lyandres, Zhdanov, and Hsieh (2011) all examine the issue of mergers around IPOs. Celikyurt, Sevilir, and Shivdasani (Table 2) restrict their analysis to 1,295 IPOs from 1985-2004 that raised at least $100 million ($2005) each, and report that 55% of the firms made at least one acquisition within one year of the IPO, and that 74% of the companies made at least one acquisition within five years of the IPO. Hovakimian and Hutton (2010, Table I) use 5,771 IPOs from 1980-2006 and report that 19% of the firms made at least one acquisition within a year of the IPO. They also show in their Figure 1 that the fraction of firms going public that subsequently made an acquisition increased dramatically from the 1980s to the 1990s. Both Brau, Couch, and Sutton (2011, Table 1) and Arikan and Stulz (2011, Table 2) confirm this pattern.

Using a sample of 3,457 IPOs from 1985-2003, Brau, Couch, and Sutton (2011, Table 1) report that 33% of their sample made an acquisition during the first year after going public, with the percentage at 20% or lower in 1985-1989, and above 20% in every year since then. Both Celikyurt, Sevilir, and Shivdasani (2010, Table 4) and Hovakimian and Hutton (2010, Table III) report that the IPO firms make acquisitions using both cash raised in the IPO and stock issuances, while Arikan and Stulz (2011, Table 4) find that IPO firms use more cash than equity in acquisitions in their sample of IPOs from 1979-2002. Furthermore, Celikyurt, Sevilir, and Shivdasani (Table 2) point out that the average acquisition expenditures are greater than those on either capital expenditures or research and development. Arikan and Stulz (2011, Table 10) report that acquisitions of private firms by acquirers that recently went public have an average announcement return of 1.38%. This positive announcement effect is consistent with our hypothesis that small firms must grow fast to realize economies of scale and scope.

Our hypothesis that the reduction in small company IPOs is at least partly due to an increase

in economies of scale and scope produces a further testable cross-sectional implication. If the changes in economies of scale and scope are bigger in some industries than others, we predict that there should be more M&A activity in those industries with a bigger increase. To test this implication, we would need industry definitions and measures of which industries have seen the greatest increase in the importance of economies of scope. Because increased merger activity might mean a higher propensity to sell out in a trade sale prior to an IPO, the cross-sectional prediction for IPO volume is less clear. In any case, we leave the testing of this implication for future work.

We can summarize the evidence in the above-mentioned studies of post-IPO acquisitions and our Table 7 as showing that a large, and increasing, fraction of firms that do go public merge, either as a target or an acquirer. Rather than depending on organic growth, these firms speed up the process of achieving economies of scale and economies of scope through mergers. Combined with the evidence in our other tables, it appears that the attractiveness of being a publicly traded small independent firm has noticeably declined, strengthening the case for the economies of scope hypothesis. Inconsistent with the regulatory overreach hypothesis, there has been no increase in the fraction of recent IPOs that subsequently go private as an independent firm.

8. Time-series Regressions Explaining Scaled IPO Activity

So far, we have presented univariate evidence consistent with our hypothesis that the increasing importance of economies of scope and speed in bringing products to market is an important determinant of the decline in IPOs, particularly among small firm IPOs. In this section, we conduct time-series regressions using scaled quarterly IPO activity as the dependent variable. Our goal is to show that, after controlling for other determinants of IPO volume, there has been a long-term downward trend in IPO volume rather than an abrupt decline after 2000. Specifically,

the economies of scope hypothesis predicts a long-term steady decline in IPO volume, especially for small company IPOs, whereas the regulatory overreach hypothesis predicts a discrete drop after SOX was implemented.

For this purpose, we estimate the following regression where we use four measures of IPO volume: *Model 1*: IPOs/Real GDP, *Model 2*: Small firm IPOs/Real GDP, *Model 3*: Large firm IPOs/Real GDP, and *Model 4*: Small firm IPOs/IPOs:

$$\begin{aligned}\text{IPO Volume}_t = {} & \alpha + \beta_1 \times \text{Time trend} + \beta_2 \times \text{SOX dummy} + \beta_3 \times \text{Real GDP growth}_{t,t+3} \\ & + \beta_4 \times \text{Future Nasdaq return}_{t+1,t+4} + \beta_5 \times \text{Closed-end fund discount}_{t-4} \\ & + \beta_6 \times \text{M/B for small firms}_{t-2} + \beta_7 \times \text{Nasdaq return}_{t-1} + \beta_8 \times \text{IPO initial return}_{t-1} \\ & + \beta_9 \times \text{Fraction of small public firms with negative EPS}_{t-1} + \beta_{10} \times \text{Quarter 1 dummy} + \varepsilon_t, \\ \varepsilon_t = {} & \rho \times \varepsilon_{t-1} + u_t,\ u_t :\ N\left(0, \sigma^2\right). \end{aligned} \quad (2)$$

Panel A of Table 8 reports the quarterly time series regression results using maximum likelihood estimation with a first-order autoregressive error term AR(1). The choice of using real GDP to scale IPO volume in Models 1 through 3 is motivated by the assumption that the number of IPOs should be proportional to the size of the economy. In Model 4, the dependent variable is the ratio of small firm IPO volume to total IPO volume, and thus is not influenced by changes in real GDP. As before, we define small and large firm IPOs on the basis of a cutoff of pre-IPO last twelve month sales of $50 million ($2009). Approximately 50% of IPOs fit into each of these two categories. Thus, if the effect of a variable is the same on small and large firm IPOs, the coefficients in Models 2 and 3 should be of the same order of magnitude, and these coefficients should be half as big as in Model 1. Figure 4 depicts the time variation in the scaled quarterly volume of small and large firm IPOs over the 1980 to 2009 period.

Our specification nests the economies of scope and regulatory overreach hypotheses. We use a time trend variable to capture the impact of changes in the importance of economies of scope and speed to the product market upon scaled IPO volume. Ideally, a direct measure of the

importance of economies of scope and scale would be preferred. One possible measure, the aggregate number of patents granted, suffers from confounding effects associated with changes in patent laws and their implementation that occurred during our sample period. A negative coefficient on the time trend would suggest that IPO volume experiences a continuous decline, just as Campbell, Lettau, Malkiel, and Xu (2001) use a time trend to test for a gradual increase in idiosyncratic stock volatility. In contrast, if excessive regulatory costs are a cause of the low IPO volume observed in the last decade, a dummy variable for this period should have a significant negative coefficient. The SOX dummy equals zero before the third quarter of 2002 and equals one thereafter. This dummy variable is intended to capture the impact of SOX on IPO volume after SOX was enacted on July 30, 2002.[12]

Following Lowry (2003), our regression specification incorporates controls for capital demands (real GDP growth), investor sentiment (future Nasdaq returns and the closed-end fund discount), stock market conditions (lagged Nasdaq returns, the small firm market-to-book ratio, and lagged IPO average first-day returns), and a first-order autoregressive error term.[13]

At the core of our empirical findings is a negative coefficient on the time trend for small firm IPOs (Model 2) as well as the ratio between small firm IPOs and total IPOs (Model 4). For Model 2, the coefficient of -6.77 (with a t-statistic of -2.00) on the time trend implies that by the end of our sample period, the quarterly volume of small firm IPOs per trillion dollars of annual real GDP declines by 8.0 (-6.77×0.01 trend per quarter×118 quarters) from the beginning of the sample. Compared with a sample average of 3.3 for the scaled quarterly small firm IPO volume (reported in Panel B of Table 8), the time trend is economically significant. The Model 4 estimate

[12] The decline in analyst coverage story would suggest a more continuous change in small company IPO volume, with discrete changes associated with the decline in Nasdaq bid-ask spreads starting in May 1994, the implementation of Reg FD in October 2000, decimalization occurring in 2001, and the Global Settlement in April 2003. See Weild and Kim (2008, 2009) for further details.

[13] The coefficients of approximately 0.76 on the autoregressive error term in our regressions using 1980-2009 data are almost identical to those reported by Lowry (2003) in her Table 3 regressions using 1972-1996 data.

of the time trend is also statistically significant and negative. This finding suggests that small firm IPOs exhibit a stronger downward trend than large firm IPOs, in line with our hypothesis that the increased importance of economies of scale and scope exert a greater adverse impact on small firm IPOs. This result is further corroborated by the absence of a statistically significant time trend among large firm IPOs (Model 3).

Inconsistent with the regulatory overreach hypothesis, the SOX dummy is never statistically significant in the presence of the time trend and our control variables. For instance, for Models 2 and 4, the estimates of the SOX dummy are 0.08 and -0.05, with t-statistics of 0.05 and -0.69, respectively. Such a finding compliments our evidence in Table 6 regarding international listings and the Figure 2 evidence on profitability changes, which suggest that the impact of SOX is insufficiently large to account for the observed decline in IPO volume.

In sum, the regression evidence is supportive of the economies of scope hypothesis. In particular, the negative time trend estimates support our argument that the increasing importance of economies of scope and speed is a driver of the decline in IPO volume since 2000, especially for small firms, suggesting that small firms are particularly vulnerable to changes in technology.

9. Ruling Out Explanations Linked to Litigation Risk and Public Market Valuations

9.1 Litigation risk

Additional explanations for the decline in IPO activity beyond those that we have discussed have been offered by Angel (2011) and others. Among these additional explanations are that the litigation environment in the U.S. imposes substantial costs on public firms. However, litigation costs are unlikely to explain the dramatic decline of small company IPOs. According to the Class Action Filings Index published by the Securities Class Action Clearinghouse at Stanford Law School in cooperation with Cornerstone Research, the annual number of class action filings has

not increased in recent years.[14] Specifically, the average annual number of securities class actions in 1997-1999 is 184, while the average in 2000-2009 is 189.5, despite an increase in filings after the financial crisis.[15] Thus, we are unable to find evidence that increased litigation risk has had a greater deterrent effect on potential IPOs in recent years than in the 1990s.

9.2 Public market valuations

Many articles have documented that there are more IPOs when public market valuations are high (e.g., Lerner (1994, Figure 1) and Lowry (2003, Tables 3 and 4)). This "valuation" view generates the prediction that IPO volume will recover to the lofty levels of the 1980s and 1990s if and when public equity market valuations recover to their previous peaks. The Nasdaq index peaked at over 5,000 in March 2000 and, as of March 2012, has not been much above 3,000 since then. Part of the high volume of IPOs in the late 1990s could thus be attributable to unsustainably high market valuations that were given to technology stocks. It should be noted that although valuations peaked in 2000, there were many more small companies going public in 1986 and 1992-1996 than in 1999-2000. In our Table 8 time-series regressions, our controls for valuation levels have the predicted signs, but are unable to explain much of the variation in IPO volume. Thus, the paucity of IPOs during the last decade cannot be attributed merely to temporarily depressed stock market valuations.

10. Conclusions

Although the gross proceeds raised in U.S. IPOs this decade has not precipitously declined, the number of IPOs, especially the number of small company IPOs, has fallen. During 1980-2000, an average of 165 small company (pre-IPO inflation-adjusted annual sales of less

[14] See http://securities.stanford.edu/index.html for details on this index.

[15] The Class Action Filings Index excludes "IPO allocation" lawsuits, mainly because these complaints do not allege that the IPO firms are engaged in any frauds in their own business or financials. Including the IPO allocation lawsuits adds 312 filings in 2001 and 1 filing in 2002, but has no impact in other years.

than $50 million) IPOs occurred each year, and this number has dropped by more than 80% to an average of only 30 deals per year during 2001-2009.

Many commentators have argued that SOX compliance costs and a decline in the IPO "ecosystem" of underwriters focusing on technology stocks and providing analyst coverage are the main reasons for why small company IPOs have been uncommon in the U.S. over the last decade. Although we do not dispute that the 2002 Sarbanes-Oxley Act and the 2003 Global Settlement have reduced the attractiveness of being public for small companies, we argue that the more fundamental problem is the deterioration in the profitability of small companies.

We posit that there has been a fundamental change in many sectors of the economy whereby the importance of bringing products to market quickly has increased. This hypothesized change has resulted in lower profits for independent small companies relative to the potential profits generated as part of a larger organization that can realize economies of scope and rapidly expand production. If this explanation is correct, fewer firms are going public and staying independent because value is being created in a sale to a strategic buyer in the same or related industry.

We report that among small company IPOs, the percentage of firms reporting negative profits in the three years after the IPO has increased from an average of 58% in 1980-2000 to 73% in 2001-2009. Furthermore, the post-IPO abnormal returns earned by investors on small company IPOs have been low, underperforming a style benchmark by an average of 17.3% in the three years after going public, compared to outperformance of 2.6% for large company IPOs. Of those companies that do go public, many are subsequently involved in M&A deals, either as a target or an acquirer, or both. The evidence is consistent with an environment of "eat or be eaten," where slow organic growth as an independent company is less attractive than quickly achieving economies of scope via being acquired.

In addition to providing univariate evidence supporting our economies of scope hypothesis,

we report the results of time series regressions with the quarterly volume of IPOs scaled by real GDP as the dependent variable and a number of control variables present. Consistent with our economies of scope hypothesis, there is a negative time trend in scaled IPO volume, and the effect is economically and statistically more pronounced for small company IPOs than for large company IPOs. The time trend coefficient of -6.77 per quarter for small firm IPOs implies a decline of 8.0 scaled IPOs from 1980 to 2009, a large effect relative to the quarterly mean value of 3.3 small firm IPOs per trillion dollars of inflation-adjusted annual GDP. For large firm IPOs, the time trend coefficient of -2.36 implies a decline from 1980 to 2009 of 2.8 scaled IPOs relative to a quarterly mean value of 3.2. Furthermore, a dummy variable for the period after SOX was implemented in July 2002 is economically and statistically indistinguishable from zero, inconsistent with the regulatory overreach hypothesis.

If we are right, regulatory changes aimed at increasing the number of IPOs are likely to have minor effects, since the decline in IPOs is not due to a broken IPO market, but because small independent companies are not necessarily the profit-maximizing form of organization. Consequently, U.S. capital markets are unlikely to see a resurrection of IPO volume to the levels that were common in the 1980s and 1990s. Even more important from a public policy perspective, if our economies of scope hypothesis is correct, encouraging small firms to remain independent rather than realize greater value as part of a larger organization might harm the economy.

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Table 1

Number of IPOs Categorized by the Last Twelve Month (LTM) Sales, 1980-2009

The sample of 7,443 initial public offerings excludes IPOs with an offer price below $5, unit offers, ADRs, closed-end funds, REITs, SPACs, bank and S&L IPOs, limited partnerships, small best efforts offers, and firms not listed on CRSP within six months of the offer date. Small and large firm IPOs are categorized on the basis of the last twelve month (LTM) sales prior to the IPO, expressed in terms of 2009 purchasing power. 20 IPOs with missing LTM sales are placed in the less than $50 million in sales category. Proceeds are in billions of dollars ($2009), and represent the aggregate amount raised in all of the IPOs, excluding overallotment options that get exercised. * indicates that the change from 1980-2000 to 2001-2009 is statistically significant at the 1% level assuming autocorrelated and heteroscedastic error terms. Ψ indicates that the decrease in small firm IPOs is greater than the decrease in large firm IPOs at the 1% level in seemingly unrelated regressions (SURs) with autocorrelated and heteroscedastic error terms.

Period	No. of IPOs	No. of IPOs		Percentage of IPOs		Total Proceeds ($ billions)
		small firms	large firms	small firms	large firms	
1980	73	38	35	52%	48%	$2.4
1981	197	138	59	70%	30%	$5.7
1982	80	56	24	70%	30%	$2.3
1983	449	273	176	61%	39%	$19.2
1984	177	98	79	55%	45%	$4.8
1985	183	90	93	49%	51%	$8.9
1986	396	191	205	48%	52%	$27.5
1987	284	125	159	44%	56%	$22.2
1988	102	40	62	39%	61%	$6.9
1989	113	43	70	38%	62%	$9.2
1990	110	43	67	39%	61%	$7.2
1991	287	106	181	37%	63%	$24.7
1992	412	180	232	44%	56%	$35.3
1993	509	218	291	43%	57%	$47.4
1994	404	199	205	49%	51%	$25.7
1995	457	241	216	53%	47%	$41.4
1996	675	392	283	58%	42%	$59.0
1997	473	251	222	53%	47%	$43.1
1998	284	141	143	50%	50%	$45.4
1999	477	327	150	69%	31%	$85.3
2000	380	273	107	72%	28%	$82.3
2001	79	24	55	30%	70%	$42.1
2002	66	14	52	21%	79%	$26.8
2003	62	14	48	23%	77%	$11.4
2004	175	68	107	39%	61%	$36.5
2005	160	43	117	27%	73%	$31.8
2006	157	48	109	31%	69%	$32.9
2007	160	55	105	34%	66%	$37.5
2008	21	4	17	19%	81%	$22.8
2009	41	4	37	10%	90%	$13.2
1980-2009	7,443	3,737	3,706	50%	50%	$860.8
Annual Averages:						
1980-2000	311	165	146	53%	47%	$28.8
2001-2009	102*	30*	72*,Ψ	30%	70%	$28.3
1980-2009	248	125	124	50%	50%	$28.7

Table 2

Profitability of Recent IPOs and Seasoned Firms by Fiscal Year, 1980-2009

This table reports the percentage of recent IPOs and seasoned publicly traded firms with negative EPS each year. Columns 1-4 are for IPOs and columns 5-8 are for seasoned firms. In columns 1-4, for fiscal year t we use IPOs where year t is one of the first 3 post-IPO fiscal years, with the first post-IPO fiscal year ending at least 6 months after the IPO. Small and large firms are defined, for columns 1-4, on the basis of pre-IPO annual sales of $50 million ($2009), and for columns 5-8, on the basis of fiscal year sales of $250 million ($2009). For example, there are 25 small company IPOs for which fiscal year 1980 is one of their first three post-IPO fiscal years, and 28% of these 25 companies had negative earnings in fiscal 1980. For companies with at least 3 years of seasoning, fiscal 1980 has 1,474 firms with less than $250m ($2009) in sales, with 21% of these firms having negative earnings.

	IPOs from the prior 3 years				All CRSP/Compustat firms with at least 3 years trading history			
	small firm IPOs		large firm IPOs		small firms		large firms	
Fiscal Year	No. (1)	EPS<0 (2)	No. (3)	EPS<0 (4)	No. (5)	EPS<0 (6)	No. (7)	EPS<0 (8)
1980	25	28%	45	2%	1,474	21%	1,753	6%
1981	78	29%	76	8%	1,455	24%	1,697	7%
1982	179	34%	103	17%	1,646	32%	1,591	13%
1983	228	45%	121	22%	1,724	35%	1,565	11%
1984	415	44%	232	10%	1,846	37%	1,573	10%
1985	381	41%	253	17%	1,872	44%	1,499	14%
1986	381	41%	308	21%	2,124	46%	1,507	16%
1987	342	43%	366	17%	2,173	45%	1,511	14%
1988	345	41%	397	16%	2,150	45%	1,530	12%
1989	263	44%	324	22%	2,338	46%	1,598	15%
1990	174	48%	249	24%	2,493	46%	1,646	18%
1991	117	44%	204	24%	2,518	47%	1,664	21%
1992	246	52%	347	19%	2,515	44%	1,711	17%
1993	347	56%	499	16%	2,848	40%	1,800	17%
1994	515	55%	678	13%	2,887	40%	1,908	11%
1995	523	53%	638	19%	2,937	39%	2,043	14%
1996	673	55%	660	20%	3,178	40%	2,239	14%
1997	755	59%	611	22%	3,290	41%	2,368	14%
1998	755	63%	637	26%	3,249	45%	2,456	18%
1999	576	66%	524	32%	3,316	47%	2,550	17%
2000	631	83%	431	42%	3,253	48%	2,548	20%
2001	543	91%	290	52%	3,209	53%	2,468	28%
2002	384	87%	234	49%	3,168	50%	2,495	24%
2003	146	77%	157	31%	3,153	48%	2,530	21%
2004	60	80%	153	14%	2,879	46%	2,603	14%
2005	86	66%	207	16%	2,660	44%	2,592	15%
2006	129	71%	276	17%	2,448	45%	2,552	13%
2007	135	72%	300	24%	2,375	48%	2,498	16%
2008	121	76%	272	35%	2,322	57%	2,499	31%
2009	74	74%	183	36%	2,327	61%	2,477	26%

Table 3

Number of Post-IPO Fiscal Years with Nonnegative and Negative EPS, by Industry

This table reports operating performance up to 3 fiscal years after the IPO for small and large firms, categorized by (i) all IPOs (Panel A), (ii) tech and biotech IPOs (Panel B), and (iii) IPO firms in other industries (Panel C) We use earnings per share (Compustat variable EPSPX: Basic Earnings Per Share Excluding Extraordinary Items) to classify each fiscal year into nonnegative and negative categories. Small and large IPO firms are identified by the last twelve months (LTM) sales prior to the IPO, with $50 million in 2009 purchasing power being the cutoff number. We identify the first post-IPO fiscal year as the first fiscal year ending at least six months after the IPO. Consequently, the first post-IPO fiscal year may be a different calendar year than the IPO year (this is always true for IPOs conducted during July-December). To classify firms by industry, we use the SIC code from the Thomson Reuters new issues database showing the industry to which a company belongs at the time of the IPO. All internet-related firms are classified as technology firms. There are 7,443 IPOs from 1980 to 2009, of which 7 companies have been deleted because we are missing all earnings numbers, resulting in a sample size of 7,436 IPOs. For the 233 IPOs for which Compustat's EPSPX is missing, we use the LTM EPS for t=+1. In our calculations, the sum of "EPS≥0" and "EPS<0" is up to three times the number of IPOs. For firms that do not have Compustat-listed EPSPX information for post-IPO fiscal years 2 and/or 3, there are fewer than three observations per firm. For example, the top row of Panel A reports that of 1,091 small company IPOs from 1980-1989, 1,648 of the reported fiscal years in years +1 to +3 had nonnegative EPS, and 1,200 (42%) had negative EPS.

	Small firm IPOs (sales<$50m)				Large firm IPOs (sales >$50m)			
IPO year	No.	EPS≥0	EPS<0	%<0	No.	EPS≥0	EPS<0	%<0
Panel A: All IPO firms								
1980-1989	1,091	1,648	1,200	42%	960	2,042	482	19%
1990-1998	1,771	1,930	2,714	58%	1,840	3,858	1,068	22%
1999-2000	600	155	1,263	89%	257	318	340	52%
2001-2009	272	192	512	73%	645	1,281	403	24%
1980-2000	3,462	3,733	5,177	58%	3,057	6,218	1,890	23%
2001-2009	272	192	512	73%	645	1,281	403	24%
Panel B: Tech and Biotech IPO firms								
1980-1989	508	767	609	44%	168	367	99	21%
1990-1998	979	912	1,697	65%	411	769	346	31%
1999-2000	472	112	1,026	90%	120	85	219	72%
2001-2009	192	103	382	79%	186	304	155	34%
Panel C: IPO firms in all other industries								
1980-1989	583	881	591	40%	792	1,675	383	19%
1990-1998	792	1,018	1,017	50%	1,429	3,089	722	19%
1999-2000	128	43	237	85%	137	233	121	34%
2001-2009	80	89	130	59%	459	977	248	20%

Table 4
Long-run Returns on IPOs Categorized by the Pre-issue Sales of the Firm

IPOs from 1980-2009 meeting the Table 1 selection criteria are used, with buy-and-hold returns calculated from the first CRSP-reported closing price through the earlier of the third year anniversary of the IPO, the delisting date, or December 31, 2010. Buy-and-hold abnormal returns (*BHAR*) are defined in equation (1) in the text. The sample size is 7,439 firms (four IPOs that are included in other tables have been deleted because they were actually REITs or a follow-on). Small and large company IPOs are defined on the basis of whether the pre-IPO last twelve months sales are less than or greater than $50 million (using 2009 purchasing power based on the CPI). Market-adjusted returns use the CRSP value-weighted index. Style adjustments use firms matched by market cap and book-to-market ratio with at least five years of CRSP listing and no follow-on equity issues in the prior five years. For post-book values we use the post-issue common equity numbers from the Thomson Reuters new issues database with corrections that rely on the prospectus. For the remaining missing numbers we use the equity book values reported for the nearest quarter after the IPO on COMPUSTAT, and further missing numbers are calculated using the reported pre-IPO equity book values plus the amount of the proceeds (assuming that overallotment option shares and costs of issuing offset each other) times the fraction of primary shares in the IPO. If the post-issue book value is still missing (approximately 1% of IPOs), we use the market-adjusted return as the style-adjusted return. For dual-class shares, the post-issue book-to-market ratio is calculated using the larger of the post-issue number of shares reported from Thomson Reuters (with corrections to account for all share classes) and the total shares outstanding reported from CRSP. All returns include dividends and capital gains, including the index returns. 20 firms with missing pre-IPO sales are assumed to have sales of less than $50 million.

		Average	Average 3-year Buy-and-hold Return		
Sales	Number of IPOs	First-day Return	Unadjusted	Market-adjusted	Style-adjusted
1980-1989	2,054	7.2%	22.5%	-22.7%	2.3%
small	1,097	9.0%	11.8%	-34.7%	-2.4%
large	957	5.2%	34.8%	-8.9%	7.8%
1990-1998	3,609	14.8%	39.4%	-21.3%	-0.9%
small	1,787	18.5%	27.3%	-35.0%	-7.9%
large	1,822	11.2%	51.3%	-7.9%	5.9%
1999-2000	856	64.5%	-53.3%	-31.8%	-59.1%
small	602	72.4%	-68.5%	-46.7%	-66.7%
large	254	45.9%	-17.2%	3.4%	-41.1%
2001-2009	920	11.9%	14.5%	3.2%	-7.0%
small	275	8.6%	-10.2%	-19.6%	-30.2%
large	645	13.2%	25.0%	12.9%	3.0%
1980-2009	7,439	18.1%	21.0%	-19.9%	-7.5%
small	3,761	23.6%	4.7%	-35.7%	-17.3%
large	3,678	12.4%	37.7%	-3.7%	2.6%

Table 5

Analyst Coverage After the IPO

This table reports the percentage of small and large company IPOs during 1994–2009 with a midpoint of the original filing range no lower than $8 that receive analyst coverage. 3,682 of the 4,071 IPOs during 1994–2009 satisfy the minimum midpoint requirement. Small and large company IPOs are defined on the basis of whether the pre-IPO last twelve months sales exceeds $50 million in 2009 dollars. Analyst coverage data are from I/B/E/S and other sources. I/B/E/S data start in 1993, so the sample period is from 1994 to 2009. "% covered by a lead in year 1" reports the percentage of IPOs in cohort year t that has at least one analyst report by a lead underwriter by the end of the first year after the issue date. "% covered in year 1" counts the percentage of IPOs that have at least one analyst report from any source by the end of the first year after the issue date. "% covered in year 2" counts the percentage of IPOs that have at least one analyst report in I/B/E/S in the second year after the issue, conditional on the IPO firm surviving into the second year. "% covered in year 3" is defined similarly as "% covered in year 2". To mitigate the concern that I/B/E/S analyst coverage data is incomplete, we collect the I/B/E/S EPS forecast data on IPOs. If there is no recommendation but if an analyst made an earnings forecast for a firm, we assume that the analyst also covered the firm.

IPO Year	Number of IPOs	% covered by a lead in year 1	% covered in year 1	% covered in year 2	% covered in year 3	Mean no. of leads per IPO
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Small company IPOs (sales <$50m)						
1994	163	85.9%	96.3%	85.6%	80.4%	1.0
1995	200	95.0%	97.0%	84.6%	78.3%	1.0
1996	354	97.5%	98.9%	81.7%	70.1%	1.0
1997	224	95.1%	98.2%	76.5%	69.5%	1.0
1998	140	99.3%	100.0%	74.1%	70.4%	1.0
1999	340	99.7%	100.0%	82.5%	68.1%	1.1
2000	274	98.9%	99.6%	77.5%	70.0%	1.1
2001	24	95.8%	95.8%	78.3%	81.0%	1.3
2002	15	100.0%	100.0%	86.7%	85.7%	1.6
2003	16	100.0%	100.0%	81.3%	93.3%	1.4
2004	71	97.2%	100.0%	93.0%	91.0%	1.5
2005	49	93.9%	98.0%	89.6%	89.4%	1.6
2006	54	90.7%	100.0%	90.7%	81.6%	1.6
2007	60	96.7%	100.0%	91.5%	76.8%	1.6
2008	4	75.0%	100.0%	100.0%		1.5
2009	6	100.0%	100.0%			2.2
Panel B: Large company IPOs (sales > $50m)						
1994	165	89.7%	99.4%	91.5%	83.8%	1.0
1995	184	92.9%	99.5%	90.7%	87.6%	1.0
1996	236	99.6%	100.0%	91.3%	85.0%	1.0
1997	185	100.0%	100.0%	90.2%	72.1%	1.0
1998	117	98.3%	100.0%	87.9%	68.9%	1.1
1999	118	99.2%	100.0%	89.2%	80.8%	1.2
2000	95	98.9%	100.0%	90.4%	95.0%	1.5
2001	53	98.1%	100.0%	100.0%	96.0%	1.6
2002	48	100.0%	100.0%	97.9%	97.7%	1.5
2003	44	97.7%	100.0%	95.2%	92.3%	1.6
2004	95	100.0%	100.0%	94.6%	96.6%	1.9
2005	105	99.0%	100.0%	96.1%	91.5%	1.9
2006	96	92.7%	100.0%	94.8%	93.2%	2.1
2007	95	96.8%	98.9%	94.7%	87.9%	2.1
2008	17	100.0%	100.0%	100.0%		2.6
2009	35	100.0%	100.0%			3.1

Table 6

The Market Share of Foreign Companies among U.S. IPOs, 1988-2011

This table includes American Depositary Receipts (ADRs) as well as other IPOs, and so has a higher total number of IPOs than those annual volumes reported in Table 1. In other words, the number of IPOs in Table 1 is computed as: Domestic + Total Foreign – ADRs. For example, the 1988 sample size of 102 (as shown in Table 1) = 100 + 10 – 8. We continue to exclude IPOs with an offer price below $5.00 per share, unit offers, SPACs, REITs, closed-end funds, partnerships, banks and S&Ls, small best efforts IPOs, and IPOs not listed on CRSP (this last screen limits the sample to NASDAQ, Amex, and NYSE-listed issues) within six months of the offer date. Bermuda-domiciled companies are included as foreign, irrespective of the main country of operations. Bermuda, Canada, China, Greece, Israel, the Netherlands, and the United Kingdom are the most common countries for IPOs that list in the U.S. Dealogic is the main source of information on foreign IPOs, because the Thomson Reuters (SDC) new issues database frequently classifies a follow-on offering that simultaneously includes a U.S. listing as an IPO, as does the NYSE. We have deleted at least 86 of these listings from the IPO counts. The count for Chinese IPOs does not include those from Hong Kong, and excludes "reverse mergers" and best efforts IPOs.

Year	Number of IPOs	Domestic	Foreign			Chinese		
			Total	ADRs	%	Total	ADRs	%
1988	110	100	10	8	9.1%	0	0	0%
1989	119	110	9	6	7.6%	0	0	0%
1990	111	107	4	1	3.6%	0	0	0%
1991	290	279	11	3	3.8%	0	0	0%
1992	416	393	23	5	5.5%	0	0	0%
1993	528	488	40	19	7.6%	1	1	0.2%
1994	421	386	35	18	8.3%	3	2	0.7%
1995	474	432	42	17	8.9%	1	1	0.2%
1996	707	643	64	32	9.1%	1	1	0.1%
1997	506	428	78	33	15.4%	4	3	0.8%
1998	297	258	39	13	13.1%	2	1	0.7%
1999	504	451	53	28	10.5%	1	0	0.2%
2000	420	335	85	40	20.2%	7	4	1.7%
2001	84	74	10	5	11.9%	2	2	2.4%
2002	68	63	5	2	7.4%	1	1	1.5%
2003	65	59	6	3	9.2%	2	2	3.0%
2004	191	161	30	17	15.7%	9	9	4.7%
2005	173	143	30	13	17.3%	8	8	4.6%
2006	172	138	34	15	19.8%	9	7	5.2%
2007	191	138	53	31	27.7%	29	27	15.2%
2008	25	18	7	4	28.0%	4	4	16.0%
2009	50	38	12	9	24.0%	9	7	18.0%
2010	126	81	45	34	35.7%	33	32	25.8%
2011	93	71	22	12	23.7%	13	11	14.0%
1988-2011	**6,141**	**5,394**	**747**	**368**	**12.2%**	**139**	**123**	**2.3%**

Table 7
Acquisitions and Buyouts of Recent IPOs, 1980-2009

In this table, we merge our IPO database with the CRSP delisting file and the target firms in the Thomson Reuters (SDC) M&A database. The delisting file gives us the delisting date and the M&A file gives us information on the identity of the acquirers. We classify M&A deals via the following screens. First, the SDC M&A deal has to be completed with an effective date after the IPO date. The effective date must be within 200 calendar days before or after the CRSP delisting date. Second, the delisted IPO must have an effective date of being acquired that is no longer than 3 years after the IPO date. This leaves us with 819 M&A deals targeting IPO firms in both the CRSP delisting and SDC M&A databases. Third, we identify each deal by searching SDC, CRSP, Compustat, Bloomberg, Wikipedia and other sources to classify acquirers into four categories: 1) strategic and public, 2) strategic and private, 3) financial and public, and 4) financial and private.

In Panel A, if the deal is identified as a leveraged buyout (LBO) and the acquirer is a special purpose acquisition company (SPAC), then the deal is labeled as financial and public. Two kinds of acquirers are classified as financial and private. If the deal is identified as an LBO and the acquirer is not a SPAC, the deal is classified as financial and private. If the deal is not an LBO, and the deal type is classified as going private in SDC and the acquisition name is identified as a private company, usually whose name includes "LP", "LLC", or "acquisition", the deal is identified as financial and private. The rest of the deals are identified as strategic. For the strategic deals, if the acquirer is a public company, listed in the US or overseas, or is a subsidiary of a public company, then it is strategic and public. Otherwise, it is classified as strategic and private. For the strategic buyer, if the acquirer is an investor group, we classify the deal as public if at least half of the investors we can identify are public, otherwise it is classified as private. For the 92 IPOs that are identified by CRSP as delisted for non-distress reasons but are not in the SDC M&A database, we search EDGAR and other sources and identify one deal as financial and private and the other 91 as strategic and public. The Percentage of Strategic Buyers includes both public and private strategic buyers.

In Panel B, we categorize IPOs into small and large company IPOs based on their pre-IPO last twelve months sales ($2009). Based on CRSP delisting codes, all companies that were either acquired by a strategic buyer or by a buyout firm are classified as mergers, since buyout firms typically set up an acquisition vehicle to merge the public company into.

Panel A: Acquisitions and Buyouts of Recent IPOs

Year	No. of IPOs	No. of cohort IPOs delisted for non-distress reasons	Number of acquisitions and buyouts by Strategic buyer Public	Private	Percentage	Financial buyer Public	Private
1980	73	2	2	0	2.7%	0	0
1981	197	13	11	1	6.1%	0	1
1982	80	6	5	1	7.5%	0	0
1983	449	29	27	2	6.5%	0	0
1984	177	16	14	2	9.0%	0	0
1985	183	18	15	1	8.7%	0	2
1986	396	40	32	4	9.1%	0	4
1987	284	44	27	3	10.6%	0	14
1988	102	7	7	0	6.9%	0	0
1989	113	8	8	0	7.1%	0	0
1990	110	5	4	1	4.5%	0	0
1991	287	9	7	2	3.1%	0	0
1992	412	36	34	2	8.7%	0	0
1993	509	44	39	3	8.3%	0	2
1994	404	42	37	4	10.1%	0	1
1995	457	79	74	4	17.1%	0	1
1996	675	115	105	7	16.6%	0	3
1997	473	82	70	5	15.9%	0	7
1998	284	40	34	2	12.7%	0	4
1999	477	106	98	6	21.8%	0	2
2000	380	55	50	4	14.2%	0	1
2001	79	7	7	0	8.9%	0	0
2002	66	11	10	1	16.7%	0	0
2003	62	8	7	0	11.3%	0	1
2004	175	24	21	0	12.0%	2	1
2005	160	24	19	4	14.4%	0	1
2006	157	19	16	1	10.8%	0	2
2007	160	18	15	1	10.0%	1	1
2008	21	3	3	0	14.2%	0	0
2009	41	1	1	0	2.4%	0	0
1980-2009	7,443	911	799	61	11.6%	3	48

Panel B: Frequency of Being Acquired or Going Private within Three Years of the IPO

Period	Small firm IPOs (sales<$50m) IPOs	Mergers	Merger rate	Large firm IPOs (sales >$50m) IPOs	Mergers	Merger rate
1980-1989	1,092	65	6.0%	962	118	12.3%
1990-1998	1,771	204	11.5%	1,840	248	13.5%
1999-2000	600	125	20.8%	257	36	14.0%
2001-2009	274	38	13.9%	647	77	11.9%
1980-2009	3,637	432	11.9%	3,706	479	12.9%

Table 8
Quarterly Time Series Regressions of Scaled IPO Volume, 1980 to 2009

This table reports the results of maximum likelihood estimation of:

$$\begin{aligned}\text{IPO Volume}_t = {} & \alpha + \beta_1 \times \text{Time trend} + \beta_2 \times \text{SOX dummy} + \beta_3 \times \text{Real GDP growth}_{t,t+3} \\ & + \beta_4 \times \text{Future Nasdaq return}_{t+1,t+4} + \beta_5 \times \text{Closed-end fund discount}_{t-4} \\ & + \beta_6 \times \text{M/B for small firms}_{t-2} + \beta_7 \times \text{Nasdaq return}_{t-1} + \beta_8 \times \text{IPO initial return}_{t-1} \\ & + \beta_9 \times \text{Fraction of small public firms with negative EPS}_{t-1} + \beta_{10} \times \text{Quarter 1 dummy} + \varepsilon_t, \\ \varepsilon_t = {} & \rho \times \varepsilon_{t-1} + u_t,\ u_t :\ N\left(0, \sigma^2\right),\end{aligned}$$

where the disturbance term, ε_t, follows a first-order autoregressive AR(1) process. The t-statistics are reported in parentheses below the coefficients. Small and large firms are defined as firms with, respectively, pre-IPO annual sales below or above $50 million ($2009). The dependent variables are the number of IPOs (Model 1), the number of small firm IPOs (Model 2), and the number of large firm IPOs (Model 3) in quarter t, all scaled by annualized quarterly real Gross Domestic Product (GDP), measured in trillions of dollars ($2009). In Model 4, the dependent variable is the fraction of IPOs that are from small firms. *Time trend* equals 0.01 for the first quarter of 1980 and increases by 0.01 for each quarter onwards until the fourth quarter of 2009. *SOX dummy* is a post-Sarbanes-Oxley dummy that equals one from the third quarter of 2002 to the fourth quarter of 2009, and zero otherwise. *Real GDP growth (%) in [t, t+3]* is the percentage growth in real GDP from quarter t to quarter t+3, downloaded from the U.S. Bureau of Economic Analysis. *Future Nasdaq return in [t+1, t+4]* is the Nasdaq Composite Index return from quarter t+1 to t+4 (in decimals). *Closed-end fund discount in t* is the average monthly closed-end fund discount in quarter t, downloaded from Jeffery Wurgler's website (in percentages). *M/B for small firms* is the market-to-book ratio for small firms (defined as less than $250 million in fiscal year sales using $2009), calculated as the sum of market value of small firms divided by the sum of book value of small firms. Both the market value and the book value are measured at the end of quarter t-2, (i.e., three to six months prior to each IPO in quarter t). *Nasdaq return in (t-1)* is the Nasdaq Composite Index return (in decimals) in quarter t-1. *IPO initial return in (t-1)* is the average first day return (in decimals) for IPOs in quarter t-1, defined as the difference between the first day closing price and the offer price divided by the offer price. *Fraction of small public firms with negative EPS in (t-1)* is defined the same as in Table 2, but measured in decimals. *Quarter 1 dummy* is a first quarter dummy that equals one in the first quarter of each year, and zero otherwise. The Durbin-Watson statistics and the pseudo R-squareds are also reported. The estimation results are based on 119 quarterly observations because we are missing *Fraction of small public firms with negative EPS in (t-1)* in the first quarter of 1980.

Panel A: Quarterly time series analysis of IPO volume

	Proxies for the dependent variable, IPO volume			
	IPOs/Real GDP	Small firm IPOs/Real GDP	Large firm IPOs/Real GDP	Small firm IPOs/IPOs
	(Model 1)	(Model 2)	(Model 3)	(Model 4)
Time trend	-8.99	-6.77	-2.36	-0.34
	(-1.59)	(-2.00)	(-0.86)	(-2.32)
SOX dummy	-0.87	0.08	-0.89	-0.05
	(-0.33)	(0.05)	(-0.70)	(-0.69)
Real GDP growth (%) in [t, t+3]	0.72	0.37	0.34	-0.00
	(2.56)	(2.24)	(2.50)	(-0.40)
Future Nasdaq return in [t+1, t+4]	-5.43	-3.42	-2.03	0.01
	(-3.89)	(-4.18)	(-2.96)	(0.25)
Closed-end fund discount in (t-4)	-0.13	-0.08	-0.04	0.00
	(-1.08)	(-1.19)	(-0.73)	(-0.97)
M/B for small firms in (t-2)	3.02	2.16	0.87	0.12
	(1.82)	(2.18)	(1.07)	(2.76)
Nasdaq return in (t-1)	2.95	1.32	1.62	-0.08
	(1.37)	(1.04)	(1.54)	(-1.00)
IPO initial return in (t-1)	-0.41	-0.98	0.55	0.16
	(-0.13)	(-0.55)	(0.37)	(1.61)
Fraction of small public firms with negative EPS in (t-1)	3.13	2.72	0.93	-0.91
	(0.24)	(0.35)	(0.14)	(-3.11)
Quarter 1 dummy	-2.26	-0.97	-1.29	0.01
	(-5.26)	(-3.81)	(-6.13)	(0.54)
AR(1) coefficient, ρ	0.76	0.77	0.76	0.81
	(11.59)	(12.02)	(11.55)	(6.06)
Constant	5.19	2.39	2.64	-0.45
	(0.93)	(0.71)	(0.97)	(-5.03)
Pseudo R-squared	75.4%	75.2%	72.6%	78.9%
Durbin-Watson	2.00	1.94	2.10	1.95

Panel B: Means and standard deviations of IPO volume

	No. of IPOs	No. of small firm IPOs	No. of large firm IPOs	Small firm IPOs/IPOs
Mean	6.53	3.34	3.18	0.44
Standard deviation	5.22	3.08	2.42	0.18

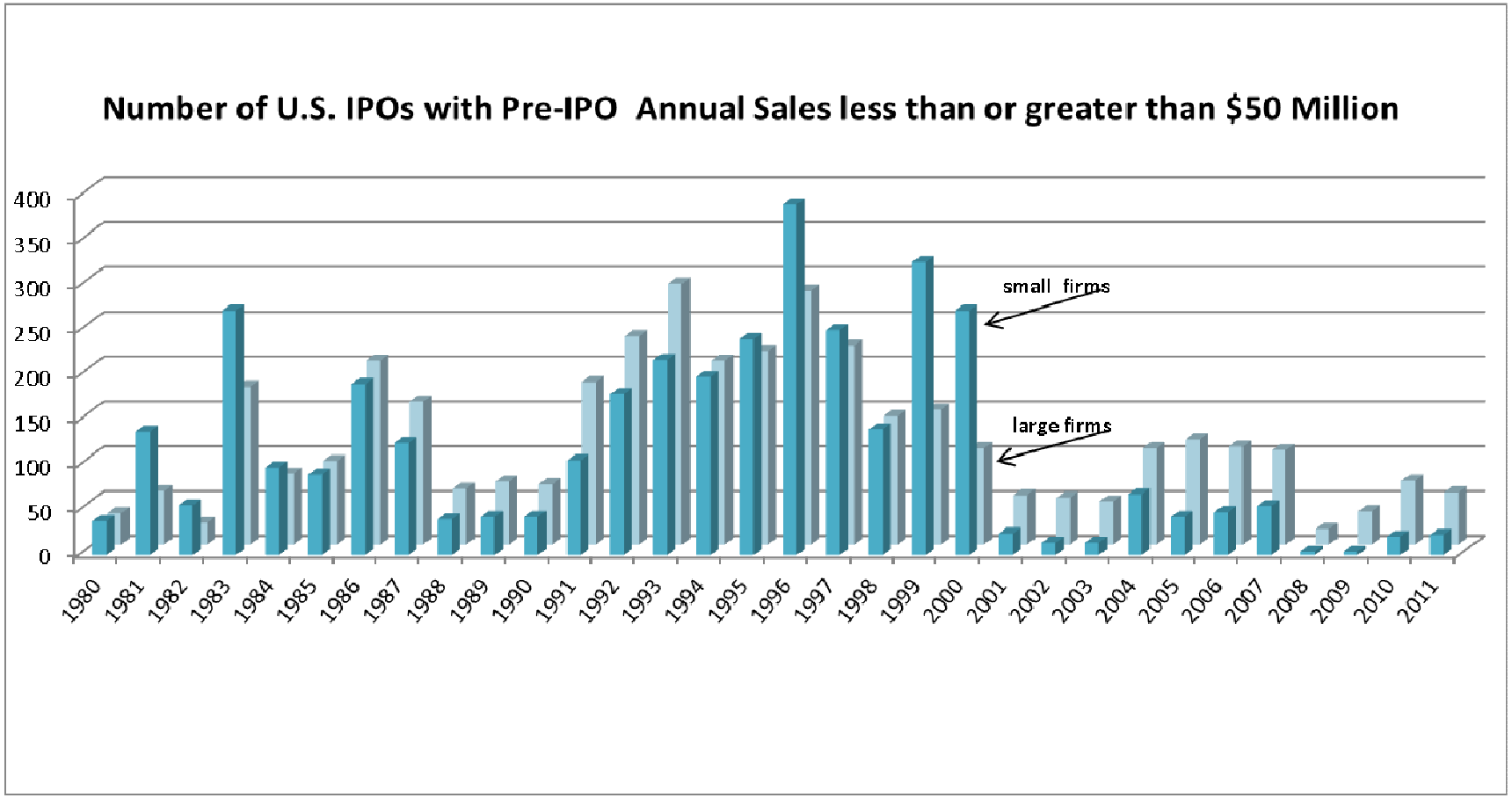


Figure 1. The number of U.S. IPOs by year, 1980-2011, with pre-IPO last twelve months sales less than (small firms) or greater than (large firms) $50 million (2009 purchasing power). Although this figure covers 1980-2011, in most of our other tables and figures we end with IPOs from 2009 since we examine earnings and analyst coverage in the year after the IPO.

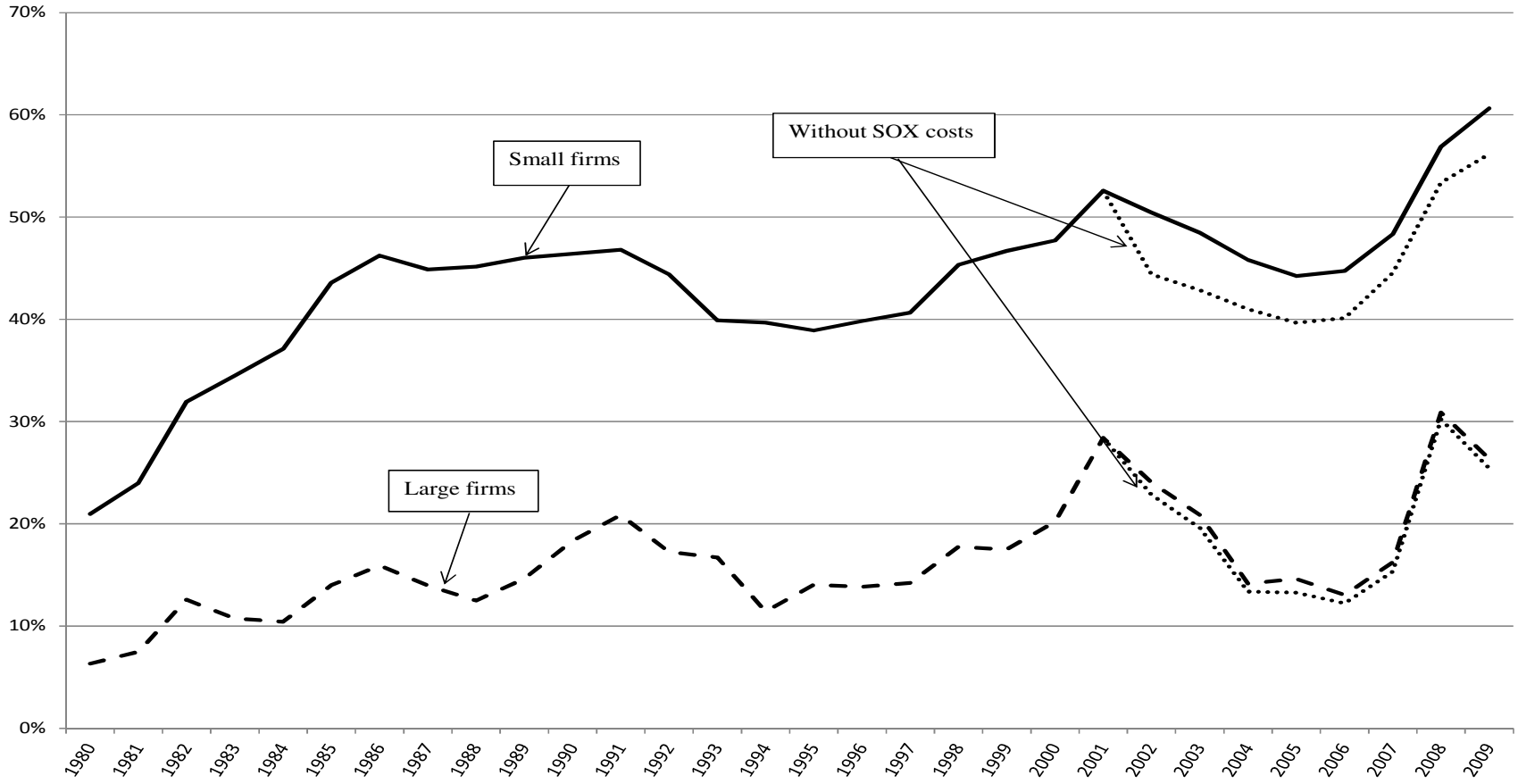
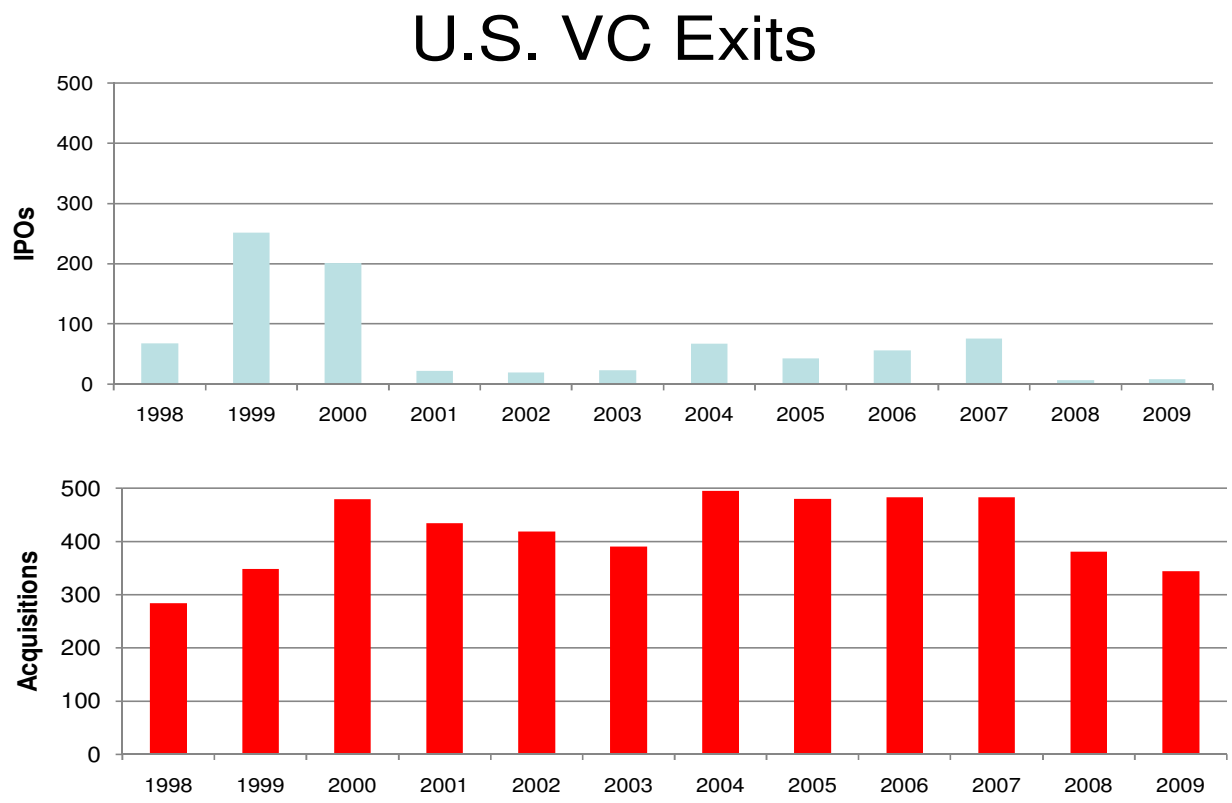


Figure 2. This graph shows the percentage of seasoned publicly traded firms with negative EPS each year, categorized by small and large firms on the basis of an annual sales cutoff of $250 million (2009 purchasing power). We start from the entire Compustat database, and select companies using the CRSP/Compustat linking table that have at least three years of records in CRSP and Compustat. For example, for fiscal 2008, only stocks that have accounting data and stock prices for 2008 and that have been publicly traded since 2005 are included. We use the Compustat variable EPSPX: Basic Earnings Per Share Excluding Extraordinary Items to classify a firm's fiscal year as reporting nonnegative or negative EPS. In each year, the percentage of small and large companies with negative EPS are reported. The black solid line is for small companies and the dashed line is for large companies. Beginning in 2002, for each firm we add SOX costs per share back and recalculate the percentage of firms that would have been unprofitable without the SOX costs, and report these percentages as the dotted lines. Based upon the numbers in Table 9 of the S.E.C.'s 2009 Office of Economic Analysis report, we add back $650,000 and $2,536,000 (2009 purchasing power) to the firm's earnings for, respectively, small and large seasoned firms. These values are after-tax amounts, thus we are implicitly assuming that firms with negative reported earnings are in a zero marginal tax bracket before these costs are added back.



Source: Dow Jones Venture One in Wilmer Hale 2010 Venture Capital Report

Figure 3. The number of exits via IPOs (top) and trade sales (bottom) of venture capital-backed portfolio companies in the U.S., 1998-2009. Trade sales include acquisitions by both public and private companies.

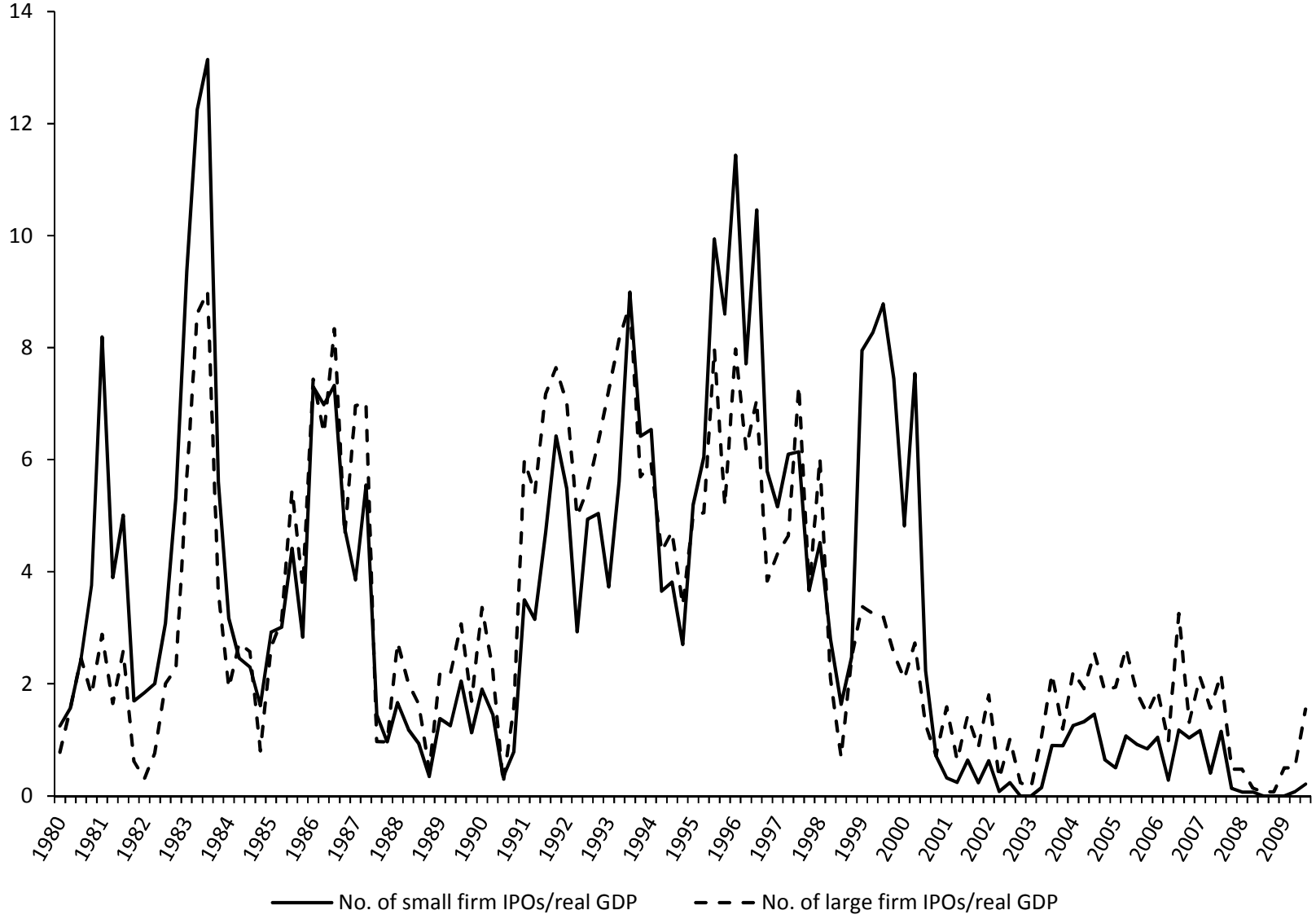


Figure 4. Quarterly IPO volume scaled by annual real GDP (in trillions of $2009). The solid line represents the number of small firm IPOs divided by real GDP, and the dashed line is the number of large firm IPOs divided by real GDP. The sample starts in the first quarter of 1980 and ends in the fourth quarter of 2009, with 120 observations.