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Where Have All the IPOs Gone?

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Abstract

During 1980–2000, an average of 310 companies per year went public in the United States. Since 2000, the average has been only 99 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 find very little support for the conventional wisdom, and we offer an alternative explanation. Our economies of scope hypothesis posits 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.

I. Introduction

The number of initial public offerings (IPOs) in the United States dropped from an average of 310 IPOs per year during 1980–2000 to only 99 IPOs per year during 2001–2012. The low level of IPOs in this decade has generated much discussion among private company executives, stock exchange officials, policymakers, 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)). In an attempt to generate more IPOs, the Jumpstart Our Business Startups (JOBS) Act was signed into law in April 2012.

Two main explanations for the prolonged drought in IPOs have been advanced. First, the Sarbanes-Oxley Act of 2002 (SOX), particularly Section 404,

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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.

Second, others attribute the drop in small-company IPO volume 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 why the ecosystem has declined have focused on the drop in bid-ask spreads that began in 1994 and the effect of this drop on the incentives for analysts to cover small firms. The U.S. Securities and Exchange Commission's (SEC) Regulation FD (Fair Disclosure) in 2000 and the 2003 Global Settlement have also been blamed (see Zweig (2010), Weild (2011)).[1] 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, 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 with the phrase "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 since 2000 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 ongoing change in the economy that has reduced the profitability of small companies, whether public or private. 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 and relying on organic (i.e., internal) growth. Earnings will be higher as part of a larger organization that can realize economies of scope and bring new technology to market faster.[2] We posit that the importance of getting big fast has increased over time due to an increase in the speed of technological innovation in many industries, with profitable growth opportunities potentially lost if they are not quickly seized.

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 low public market prices are due to either lower valuations caused

[1]In a 2009 survey, SOX, corporate governance, and Reg FD were listed as among the top three compliance challenges for small companies thinking of going public. This survey was conducted by venture capital firm DCM, and the results were included in the March 2011 presentation of National Venture Capital Association chair Kate Mitchell at the U.S. Treasury's Access to Capital conference.

[2]Economies of scope exist when the average cost of production, including marketing and distribution costs, is 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 sell one antibiotic.

by the lack of analyst coverage or to lower earnings as a public firm because of SOX and other costs. In contrast, our explanation for why many small firms are being acquired rather than going public is that earnings before compliance costs are higher as part of a larger organization that can realize economies of scope and economies of scale.

We present numerous facts that are consistent with our economies of scope hypothesis and inconsistent with the regulatory overreach hypothesis as an explanation for this prolonged drop in IPO activity. We report that among small firms, the percentage of IPOs from the prior 3 years that are unprofitable was below 60% in every year from 1980 to 1997, and it has been above 60% in every year since then. In contrast, for large-company IPOs the percentage reporting negative post-IPO earnings has shown only a small increase, other than a temporary jump after the 1999–2000 Internet bubble. We also analyze the profitability of small and large Compustat-listed companies that have been public for more than 3 years, and we 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. Importantly, the downtrend in the profitability of small companies started far before the regulatory changes that began with the SOX Act of 2002.

Of the firms that do go public, the fraction of issuers 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 growth to expand. Of those that are acquired, we show that most are acquired by other publicly traded companies, and that 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. Importantly, the increased frequency of mergers began long before public market valuations declined starting in 2000.

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.[3] Inconsistent with the regulatory overreach hypothesis, the number of small-company IPOs has not increased since then.

Furthermore, relatively few U.S. firms have chosen to go public abroad (Caglio, Hanley, and Marietta-Westberg ((2012), Table III)), and foreign listings have not been disproportionately affected (Doidge, Karolyi, and Stulz ((2009), Table 7)). We report that in every year since 2004 the percentage of U.S. IPOs that are from foreign firms has been higher than in all but a handful of prior years. In many other developed countries, including Germany and France, IPO volume has also been low since 2000.[4]

[3]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 Sept. 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.

[4]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

Of companies that do go public in the United States, we report that there has been no drop in analyst coverage. We also document 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. Vismara et al. ((2012), Table 5) report similar patterns for Europe. 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 in the United States, the more fundamental problems are the absence of profitable small companies and the paucity of small companies that grow and become highly profitable, earning high returns for investors.

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 the leading explanations for the decline in IPO volume in a time-series 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 on the time trend variable, whereas the regulatory overreach hypothesis predicts a negative coefficient on the SOX dummy variable.

In our regressions, 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 0 and statistically insignificant in all of our specifications. Our results also show that market conditions can explain only some of the low IPO volume after 2000. IPO volume has been below what would have been expected, given the usual response of IPO volume to public market valuations, since 1997.

Perhaps the closest related work focusing on economies of scope as an explanation of IPO activity is by Bayar and Chemmanur (2011), who model the choice of going public as a trade-off 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, positing 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 they have materially changed over time.

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 Jan. 2005 from Belgium, the Netherlands, and Portugal after the Paris Bourse merged with these markets to create Euronext.

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. Although our evidence supporting the hypothesis is largely indirect, our hypothesis is consistent with several patterns for which there has been no consistent explanation: a decline in small-firm profitability starting in the early 1980s, an increase in the probability of being involved in merger and acquisition (M&A) activity beginning in the mid-1990s, a decrease in the probability of a venture capital-backed (VC-backed) company exiting via an IPO starting in the early 1990s, and a lower number of IPOs relative to what would be predicted on the basis of public market valuation ratios starting in 1997. Furthermore, we are unaware of any patterns that are inconsistent with our explanation. If our economies of scope explanation is correct, regulatory reforms aimed at restoring the IPO ecosystem will have only a modest ability to affect IPO volume, and a bull market will not set off a wave of small-company IPOs.

II. The Decline in U.S. IPO Activity

Table 1 and Figure 1 show the number of companies going public in the United States by year during 1980–2012. Some of our analysis covers IPOs from this 33-year period, although we end with IPOs from 2009 or 2011 when we focus on post-IPO behavior or, due to the availability of data, start with a year other than 1980. Throughout, we restrict our definition of IPOs to exclude nonoperating companies, thus excluding closed-end funds, real estate investment trusts (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 savings and loan (S&L) IPOs, natural resource limited partnerships, and companies not listed on the Center for Research in Security Prices (CRSP) stock return files within 6 months of the IPO date. Finally, we screen out foreign-company IPOs that use American depositary receipts (ADRs), except in Table 4, where 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 310 during 1980–2000 to only 99 during 2001–2012. The low volume of IPOs in the last decade is even more noteworthy, considering that real GDP more than doubled 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 28 IPOs per year in 2001–2012.[5] The market has also

[5]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, the Graeme Howard/Todd Huxster collection of IPO prospectuses for 1975–1996, and Dealogic for 1990–2012. 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.

TABLE 1

Number of IPOs Categorized by LTM Sales (1980–2012)

The sample of 7,707 initial public offerings (IPOs) 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 6 months of the offer date. Small- and large-firm IPOs are categorized on the basis of the last 12-month (LTM) sales prior to the IPO, expressed in terms of 2009 purchasing power. Two IPOs with missing LTM sales are placed in the less than $50 million in sales category. Proceeds are in billions of dollars (2009 purchasing power) and represent the aggregate amount raised by issuing firms and selling shareholders in all of the IPOs, excluding overallotment options that get exercised. In the table, * indicates that the change from 1980–2000 to 2001–2012 is statistically significant at the 1% level assuming autocorrelated and heteroskedastic error terms, and $^{\psi}$ 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 heteroskedastic error terms.

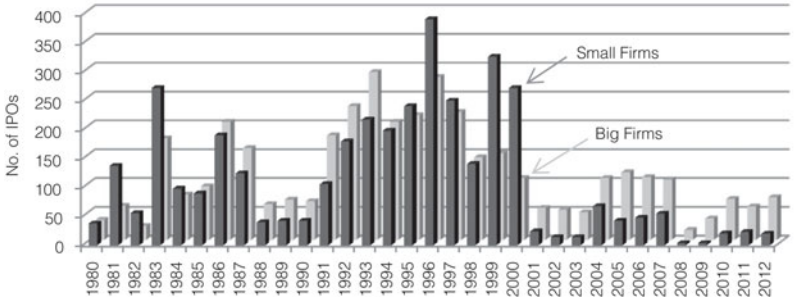
		No. of IPOs		Percentage of IPOs		
Period	Total No. of IPOs	Small Firms	Large Firms	Small Firms	Large Firms	Total Proceeds ($ billions)
1980	73	38	35	52%	48%	$2.4
1981	196	137	59	70%	30%	$5.7
1982	78	55	23	69%	31%	$2.2
1983	451	275	176	61%	39%	$19.2
1984	175	96	79	55%	45%	$4.5
1985	185	91	94	49%	51%	$8.8
1986	391	187	204	48%	52%	$25.6
1987	283	124	159	44%	56%	$22.0
1988	102	40	62	39%	61%	$6.8
1989	113	44	69	39%	61%	$9.1
1990	110	43	67	39%	61%	$7.1
1991	286	107	179	37%	63%	$24.1
1992	412	181	231	44%	56%	$34.7
1993	510	221	289	43%	57%	$46.7
1994	404	201	203	50%	50%	$25.0
1995	461	243	218	53%	47%	$41.4
1996	676	396	280	59%	41%	$57.6
1997	474	252	222	53%	47%	$42.1
1998	282	140	142	50%	50%	$44.0
1999	477	329	148	69%	31%	$83.2
2000	381	274	107	72%	28%	$81.1
2001	79	24	55	30%	70%	$41.3
2002	66	13	53	20%	80%	$26.3
2003	62	14	48	23%	77%	$11.1
2004	174	67	107	39%	61%	$35.7
2005	160	44	116	27%	73%	$31.3
2006	157	48	109	31%	69%	$32.5
2007	160	55	105	34%	66%	$37.2
2008	21	4	17	19%	81%	$22.8
2009	41	4	37	10%	90%	$13.2
2010	92	21	71	23%	77%	$29.1
2011	81	22	59	27%	73%	$25.9
2012	94	19	75	20%	80%	$29.2
1980–2012	7,707	3,809	3,898	49%	51%	$928.9
Annual Averages						
1980–2000	310	165	145	53%	47%	$28.3
2001–2012	99*	28*	71*,$^{\psi}$	28%	72%	$28.0
1980–2012	234	116	118	49%	51%	$28.1

witnessed a decline in large-company IPOs, from an annual average of 145 IPOs in 1980–2000 to 71 IPOs in 2001–2012. The average annual IPO volume during 2001–2012 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), neither a discrete drop after 2000 nor a time trend is apparent.

FIGURE 1

Number of U.S. IPOs Categorized by Pre-IPO Sales (by year)

The number of U.S. IPOs by year (1980–2012) with pre-IPO last 12-month sales less than (small firms) or greater than (big firms) $50 million (2009 purchasing power). Table 1 lists the numbers that are graphed here.



We focus on this low-frequency change in the volume of IPOs, especially the volume of small-company IPOs, which is the focus of practitioner and policymaker concern. Other articles 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), Benninga, Helmantel, and Sarig (2005), Pástor and Veronesi (2005), Yung, Çolak, and Wang (2008), and Rau and Stouraitis (2011). We now proceed to document a number of patterns consistent with our economies of scope hypothesis.

III. The Profitability of Small and Large Firms

In Table 2, we report the percentage of publicly traded firms with negative EPS each year from 1980 to 2011.[6] We report this percentage for small- and large-company IPOs (columns 2 and 4) from the prior 3 years, and for small and large seasoned firms (columns 6 and 8), which we define as firms that have been CRSP-listed for at least 3 years. We define small and large IPO firms using a cutoff of $50 million (2009 purchasing power) in pre-IPO last 12-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, with biotech firms and seasoned "loser" firms overrepresented. Our qualitative conclusions, however, are not sensitive to the exact cutoffs.

Column 2 of Table 2 shows a dramatic increase in the percentage of recent small-company IPOs reporting losses over time. In every fiscal year during

[6]We end in 2011 because the Compustat-reported earnings numbers for 2012 were not available when we did our analysis. Compustat variable EPSPX: Basic Earnings Per Share Excluding Extraordinary Items is used to classify a firm's fiscal year as reporting nonnegative or negative EPS.

TABLE 2

Profitability of Recent IPOs and Seasoned Firms by Fiscal Year (1980–2011)

Table 2 reports the percentage of recent IPOs and seasoned publicly traded firms with negative earnings per share (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 3 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 1,449 firms with less than $250 million ($2009) in sales, with 21% of these firms having negative earnings. For the annual averages, the percentages are weighted by the number of observations and do not equally weight each year.

	IPOs from the Prior 3 Years				All CRSP/Compustat Firms with at Least 3 Years of Trading History			
	Small-Firm IPOs		Large-Firm IPOs		Small Firms		Large Firms	
Fiscal Year	No. of IPOs 1	EPS < 0 2	No. of IPOs 3	EPS < 0 4	No. of IPOs 5	EPS < 0 6	No. of IPOs 7	EPS < 0 8
1980	25	28%	45	2%	1,449	21%	1,762	6%
1981	80	29%	76	8%	1,443	24%	1,698	8%
1982	178	34%	103	17%	1,639	32%	1,590	13%
1983	228	46%	121	21%	1,722	34%	1,562	11%
1984	415	44%	230	10%	1,856	37%	1,563	10%
1985	383	41%	254	17%	1,879	43%	1,491	14%
1986	384	42%	305	21%	2,144	46%	1,489	16%
1987	342	43%	366	17%	2,180	45%	1,506	14%
1988	346	40%	395	16%	2,160	45%	1,525	13%
1989	262	44%	323	22%	2,347	46%	1,595	15%
1990	174	49%	247	24%	2,507	46%	1,638	18%
1991	119	44%	203	24%	2,535	47%	1,647	21%
1992	251	51%	343	19%	2,531	44%	1,695	17%
1993	353	55%	494	17%	2,864	40%	1,782	17%
1994	522	54%	671	13%	2,905	40%	1,892	11%
1995	527	53%	632	19%	2,964	39%	2,019	14%
1996	674	55%	655	20%	3,203	40%	2,212	14%
1997	759	58%	605	22%	3,317	41%	2,342	14%
1998	763	63%	630	25%	3,280	45%	2,429	18%
1999	583	66%	514	32%	3,340	47%	2,526	17%
2000	636	82%	423	42%	3,271	48%	2,526	20%
2001	542	91%	288	52%	3,215	53%	2,453	28%
2002	385	87%	233	49%	3,180	51%	2,476	24%
2003	146	77%	156	30%	3,162	48%	2,504	21%
2004	61	80%	153	14%	2,880	45%	2,584	14%
2005	86	67%	206	16%	2,657	44%	2,581	14%
2006	130	72%	276	17%	2,444	45%	2,544	13%
2007	136	72%	299	24%	2,372	48%	2,490	16%
2008	121	76%	272	35%	2,318	57%	2,489	31%
2009	74	74%	182	36%	2,332	61%	2,467	26%
2010	37	65%	130	24%	2,244	51%	2,540	17%
2011	47	72%	168	26%	2,066	47%	2,498	17%
Annual Averages								
1980–1989	264	42%	222	17%	1,882	39%	1,578	12%
1990–1998	460	56%	498	20%	2,901	42%	1,962	16%
1999–2000	610	75%	469	37%	3,305	47%	2,526	19%
2001–2011	160	82%	215	30%	2,625	50%	2,511	20%
1980–2011	305	59%	312	23%	2,513	45%	2,066	17%

1980–1991, less than 50% of small-company IPOs from the previous 3 years were unprofitable. By contrast, in every single year since then, more than 50% of small-company IPOs from the prior 3 years have been unprofitable. For large-company IPOs, column 4 shows an increase, too, although the percentage reporting a loss never rises as high. In Table A-1 of the Internet Appendix (www.jfqa.org), we report that the Table 2 patterns are stronger in the technology sector than the nontech sector.

For firms that have been publicly traded for at least 3 years, column 6 (small firms) and column 8 (large firms) of Table 2 show the same patterns as for the recent IPOs, although the increases in the percentage of firms reporting losses are not as extreme. In addition to the trends, business cycle effects are also present, especially for the large seasoned firms.

Our findings are in line with those reported by Fama and French ((2004), Table 4 and Figure 3), who also report a corresponding increase in the fraction of both public firms and recent IPOs that are unprofitable 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 the advantage of being a large firm has increased over time due to changes in technology and globalization, the same forces responsible for the increase in the right-skewness of the distribution of income and wealth at the personal level.[7] Getting big fast has become more important in many industries because the speed of technological change has increased.[8]

Two pieces of evidence support this contention. 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 technologies.

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. Increased speed of communication leads to both a greater advantage from implementing new technology quickly and a greater opportunity cost of waiting. Thus, in some sectors, the profit-maximizing size of firms has increased and the number of firms with positive economic profits has decreased. 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.

[7] A nontechnical discussion of the causes with some academic references is contained in the *Economist* magazine's special report, "For Richer, for Poorer," in the Oct. 13, 2012 issue.

[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 Dec. 15, 2005, for small firms. We have not investigated the impact of this accounting change on reported earnings. It is likely that this change would have a bigger impact in the technology industry than in other industries due to the heavy use of employee stock options. Note, however, that the Table 2 downtrend in profitability was present before the accounting change.

IV. Evidence from Post-IPO Mergers

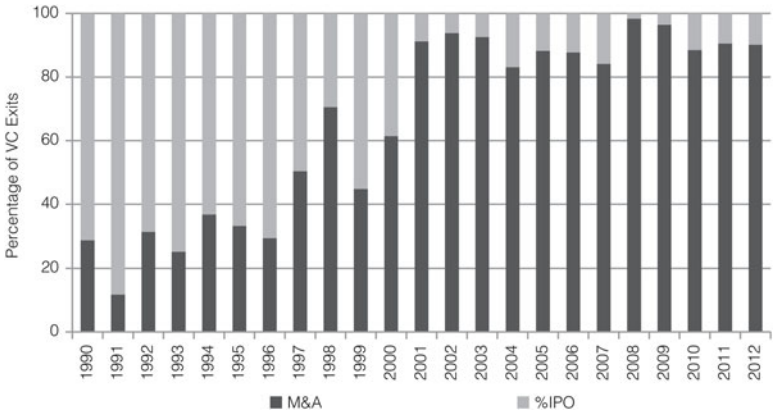
If our hypothesis that the value of small independent firms has declined relative to the value of larger firms is true, we would expect more private firms to sell out in trade sales and, for those companies that do go public, a higher propensity to be involved in a merger as either an acquirer or a target. If a lack of analyst coverage and high SOX compliance costs are important reasons 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 as independent companies.

Historically, venture capitalists have earned their biggest payoffs on portfolio companies that have gone public (Smith, Pedace, and Sathe (2011)). In Figure 2, we show the percentage of exits of VC-backed portfolio companies by IPOs (top) and by acquisitions (bottom) for 1990–2012. During all but the first 2 years of the sample period, the total number of exits is at least 200 per year, with the number over 300 in every year from 1999 to 2012. Figure 2 reveals that in 1990–2000, exits via IPOs and via trade sales were both common, although the percentage of exits via a trade sale was rising. During 2001–2012, however, exiting via an IPO has become uncommon. The patterns in Figure 2 are consistent with those reported in Poulsen and Stegemoller (2008) for 1995–2004.

FIGURE 2

Percentage of VC Exits via IPOs and Trade Sales

The percentage of exits via IPOs (top) and trade sales (bottom) of venture capital-backed portfolio companies in the United States (1990–2012). Exits that are write-offs are not included. Source: Tables 9.0 and 10.0 (pp. 13–14) of the *National Venture Capital Association 2013 Yearbook*.



The patterns in Figure 2 are worth emphasizing, for they are inconsistent with some alternative explanations of the lack of small-company IPOs. As with the profitability of small companies, there is no sudden change in 2000, but instead there is a steady increase in the percentage of exits via trade sales during the 1990s. Furthermore, since it is rare for a VC-backed company to have sufficient profitability and tangible assets to be a candidate for debt financing, the increase in trade sales cannot be explained as a substitution of debt for equity financing. Thus, the low interest rate environment in part of the last decade cannot

be viewed as an important reason for why venture capitalists are not taking their portfolio companies public.

Panel A of Table 3 reports the number of companies that are delisted for nondistress reasons in the 3 years after going public for the IPO cohorts from

TABLE 3

Acquisitions and Buyouts of Recent IPOs (1980–2011)

In Table 3, we merge our IPO database with the CRSP delisting file and the target firms in the Thomson Reuters Securities Data Company (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 more 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: i) strategic and public, ii) strategic and private, iii) financial and public, and iv) 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 identified as an LBO, but 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 United States 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 nondistress reasons but that 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 12-month 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

			No. of Acquisitions and Buyouts by				
			Strategic Buyer			Financial Buyer	
Year	No. of IPOs	No. of Cohort IPOs Delisted for Nondistress Reasons	Public	Private	Percentage	Public	Private
1980	73	2	2	0	2.7%	0	0
1981	196	13	11	1	6.1%	0	1
1982	78	6	4	2	7.7%	0	0
1983	451	29	27	2	6.4%	0	0
1984	175	16	14	2	9.1%	0	0
1985	185	18	14	2	8.6%	0	2
1986	391	40	31	5	9.2%	0	4
1987	283	44	26	4	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	286	9	6	3	3.1%	0	0
1992	412	36	34	2	8.7%	0	0
1993	510	44	38	4	8.2%	0	2
1994	404	42	37	4	10.1%	0	1
1995	461	79	72	6	16.9%	0	1
1996	676	115	101	11	16.6%	0	3
1997	474	82	69	6	15.8%	0	7
1998	282	40	33	3	12.8%	0	4
1999	477	106	96	8	21.8%	0	2
2000	381	56	51	4	14.4%	0	1
2001	79	8	8	0	10.1%	0	0
2002	66	11	10	1	16.7%	0	0
2003	62	8	7	0	11.3%	0	1
2004	174	24	21	0	12.1%	2	1
2005	160	24	19	4	14.4%	0	1
2006	157	19	16	1	10.8%	0	2
2007	160	18	14	2	10.0%	2	1
2008	21	3	3	0	14.3%	0	0
2009	41	6	4	1	12.2%	0	1
2010	92	5	3	2	5.4%	0	0
2011	81	0	0	0	0.0%	0	0
1980–2011	7,613	923	790	81	11.4%	4	49

(continued on next page)

TABLE 3 (continued)
Acquisitions and Buyouts of Recent IPOs (1980–2011)

Panel B. Frequency of Being Acquired or Going Private within 3 Years of the IPO

	Small-Firm IPOs (sales < $50m)			Large-Firm IPOs (sales > $50m)		
Period	IPOs	Mergers	Merger Rate	IPOs	Mergers	Merger Rate
1980–1989	1,087	65	6.0%	960	118	12.3%
1990–1998	1,784	206	11.5%	1,831	246	13.4%
1999–2000	603	126	20.9%	255	36	14.1%
2001–2011	316	41	13.0%	777	85	10.9%
1980–2011	3,790	438	11.6%	3,823	485	12.7%

1980 to 2011.[9] Of the 7,613 IPOs from these years, 923, or 12.1%, either went private or were acquired within 3 years of the IPO. Only 48 IPOs, or 0.6%, are involved in going private as a stand-alone company, and only 81, or 1.1%, 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, 790 of the 7,613 IPOs, or 10.3%, sold out to a publicly traded strategic buyer, and this percentage increased from the 1980s for small-company IPOs, as shown in Panel B of Table 3.

Table 3 also shows that the percentage of IPOs that are acquired within 3 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, none of the IPO cohorts from 1994 to 2009 have *less* than 10% of the firms subsequently acquired. The 2010–2011 cohorts have acquisition rates of less than 10%, but a full 3 years after the IPO has not yet occurred for these cohorts at the time of our writing, and the sample sizes are fairly small for these two cohorts.

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 (2013), Brau, Francis, and Kohers (2003), Brau, Couch, and Sutton (2012), Celikyurt, Sevilir, and Shivdasani (2010), Chemmanur, He, He, and Nandy (2011), Hovakimian and Hutton (2010), and Hsieh, Lyandres, and Zhdanov (2011) all examine mergers around IPOs. Celikyurt et al. (Table 2) restrict their analysis to 1,295 IPOs from 1985 to 2004 that raised at least $100 million ($2005) each, and they report that 55% of the firms made at least one acquisition within 1 year of the IPO and that 74% of the companies made at least one acquisition within 5 years of the IPO. Hovakimian and Hutton (Table I) use 5,771 IPOs from 1980 to 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. Brau et al. ((2012), Table 1) confirm this pattern.

[9]Bhattacharya, Borisov, and Yu (2013) report that total delisting rates (for both distress and nondistress reasons) peak 3 years after the IPO.

Using a sample of 3,457 IPOs from 1985 to 2003, Brau et al. ((2012), 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. Celikyurt et al. ((2010), Table 2) point out that the average acquisition expenditures are greater than those on either capital expenditures or research and development. Arikan and Stulz ((2013), Table 6) report that acquisitions of private firms by acquirers that recently went public have an average announcement return of 1.19%. This positive announcement effect is consistent with our hypothesis that small firms are creating value by making acquisitions to 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 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. 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 3 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. 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.

V. Has Sarbanes-Oxley Driven Away IPOs?

This section assesses the impact of the Sarbanes-Oxley Act of 2002 on U.S. and foreign IPOs, shedding further light on the relevance of the regulatory overreach hypothesis.

A. The Effect of SOX Compliance Costs on Profitability

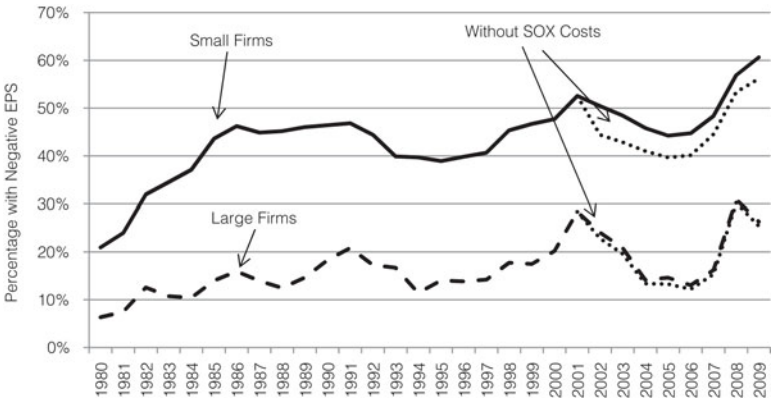
Section 404 of SOX has received widespread criticism for imposing large costs on small public firms. Beginning in 2007, the SEC approved several delays to allow the smallest public firms to postpone their compliance with Section 404(b), before permanently exempting them on Sept. 15, 2010 (SEC final rule #33-9142).

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 in this decade can be partly attributed to SOX. Iliev ((2010), p. 1163) estimates the costs of compliance and concludes that "on net, SOX compliance reduced the market value of small firms." In Figure 3, we plot the percentages of small and big seasoned firms with negative EPS, as reported in columns 6 and 8 of Table 2. As can be seen, the uptrend in the fraction of small companies reporting losses began before SOX. There is also an uptrend for big firms, but it should be remembered that our definition of big firms

FIGURE 3

Percentage of Seasoned Publicly Traded Firms with Negative EPS

Figure 3 shows the percentage of seasoned publicly traded firms with negative earnings per share (EPS) each year from 1980 to 2009, 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 we select companies using the CRSP/Compustat linking table that have at least 3 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. In each year, the percentage of small and large companies with negative EPS are reported. The 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 we report these percentages as the dotted lines. Based upon the numbers in Table 9 of the SEC's (2009) Office of Economic Analysis report, we add back $650,000 and $2,536,000 (2009 purchasing power) to the firms' after-tax earnings for, respectively, small and large seasoned firms.



($250 million in annual inflation-adjusted sales) includes many firms that would normally be classified as mid-cap or smaller.

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 unprofitable 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.[10] For example, a small firm with 10,000,000 shares outstanding would gain 6.5 cents per share if it did not have this cost, and a big firm with 100,000,000 shares outstanding would gain 2.536 cents per share. In Figure 3, we then show, for 2002 and later, the percentages of small (and big) firms that would be profitable if they did not incur the extra SOX costs.

The effect on the profitability for small firms of paying the compliance cost is 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%–5%

[10]Iliev ((2010), p. 1166) uses a regression discontinuity approach and estimates that in 2004 small firms had additional pretax audit costs of $697,890. Table 13 of the U.S. SEC (2009) report gives mean compliance costs for firms with at least 3 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, $150–$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, respectively. For the 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. Next- refers to fiscal years in progress at the time of the survey in 2009.

of the small firms from the negative EPS group. The dotted line of Figure 3 shows that without paying any SOX compliance costs, the firms' profitability would be improved. It would still be the case, however, that among the small seasoned firms, 40% or more of them would report negative EPS.

B. 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. If SOX is an important reason for why companies, especially small companies, are not listing in the United States, we might observe many U.S. companies going public abroad. In contrast, if U.S. companies are not going public because the relative advantage of being an independent firm has declined in comparison 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 United States. In a *Wall Street Journal* article, 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 United States to list in foreign markets is contained in Doidge, Karolyi, and Stulz (2009), (2013). While they document that the market share of the United States has been falling, whether measured on the basis of the number of IPOs or the proceeds, they do not detect evidence that many firms that would have listed in the United States pre-SOX are not doing so post-SOX.

Our hypothesis that small firms are not going public in the United States because the advantage of being a small independent firm has fallen applies to other countries as well. Consistent with this hypothesis, Caglio et al. ((2012), Table X) report that both Germany and France saw their domestic IPO volume drop by at least 50% in 2002–2007 relative to 1995–2001. Furthermore, the average IPO proceeds in Germany and France more than doubled, indicating a loss of small deals, similar to the U.S. pattern. Doidge et al. ((2013), Figure 1 and Table 8) also report a downtrend in IPO activity around the world, although they do not emphasize this finding.[11] Ritter, Signori, and Vismara ((2013), Figure 2) document that M&A activity in Europe has not declined, even though small-company IPO volume has.

[11] In their Table 8, column 2 panel data set regression using 1990–2011 data with the ratio of small-firm IPOs/listed companies in a country as the dependent variable, measured as a percentage, the coefficient on a measure of financial globalization (a variable that is significantly positively correlated with a time trend) is −1.656. The coefficient on the cross-product of their measure of financial globalization and a non-U.S. dummy variable is 1.359. The sum of the coefficients on their world financial globalization variable and the interaction of this variable with a non-U.S. dummy is $1.359 - 1.656 = -0.297$. The world financial globalization measure starts with a value of 118% of world GDP in 1990 and increases in an almost monotonic manner to 366% in 2011. Thus, for non-U.S. countries, their regression predicts a decrease of $-0.297 \times (3.66 - 1.18) = -0.737\%$ in scaled small-firm IPO activity from 1990 to 2011, and an even steeper decline of $-1.656 \times (3.66 - 1.18) = -4.107\%$ in the United States. For large-firm IPOs and total IPO volume, they report similar patterns. The means of the non-U.S. and U.S. dependent variables are approximately 2% and 4%, respectively, for scaled small-firm IPO volume.

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 to qualified institutional buyers that never develop liquid trading (1,572 out of 1,642 IPOs according to Vismara et al. ((2012), Table 2).

In Table 4, we report the percentage of foreign companies, including those using ADRs, going public among U.S. IPOs each year during 1980–2012. Table 4 shows that the percentage of foreign IPOs in the United States has not declined during the last 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

TABLE 4

Market Share of Foreign Companies among U.S. IPOs (1980–2012)

Table 4 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 6 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 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 delete at least 88 of these listings from the IPO counts. The count for Chinese IPOs does not include those from Hong Kong, and it excludes "reverse mergers" and best efforts IPOs.

			Foreign			Chinese		
Year	No. of IPOs	Domestic	Total	ADRs	% Foreign	Total	ADRs	% Chinese
1980	73	71	2	0	2.7%	0	0	0.0%
1981	196	191	5	0	2.6%	0	0	0.0%
1982	78	77	1	0	1.3%	0	0	0.0%
1983	451	447	4	0	0.9%	0	0	0.0%
1984	176	171	5	1	2.8%	0	0	0.0%
1985	185	182	3	0	1.6%	0	0	0.0%
1986	392	390	2	1	0.5%	0	0	0.0%
1987	283	279	4	0	1.4%	0	0	0.0%
1988	110	100	10	8	9.1%	0	0	0.0%
1989	119	110	9	6	7.6%	0	0	0.0%
1990	111	107	4	1	3.6%	0	0	0.0%
1991	289	278	11	3	3.8%	0	0	0.0%
1992	417	394	23	5	5.5%	0	0	0.0%
1993	529	488	41	19	7.7%	1	1	0.2%
1994	423	387	36	19	8.5%	3	2	0.7%
1995	478	435	43	17	9.0%	1	1	0.2%
1996	708	644	64	32	9.0%	1	1	0.1%
1997	507	430	77	33	15.4%	4	3	0.8%
1998	295	257	38	13	13.6%	2	1	0.7%
1999	505	451	54	28	10.7%	1	0	0.2%
2000	421	336	85	40	20.4%	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	26.2%
2011	93	70	23	12	24.7%	13	11	14.0%
2012	98	86	12	4	12.2%	3	3	3.1%
1980–2012	8,082	7,294	788	375	9.7%	139	123	1.7%

going public. During 2001–2012, there is an annual average of 22 foreign-company IPOs, including 12 ADR IPOs.

To summarize, the evidence in our Table 4 and Caglio et al. (2012) and Doidge et al. (2009), (2013) does not suggest that the lower number of IPOs in the United States in recent years is because issuers are fleeing U.S. markets in favor of foreign markets.

VI. Analyst Coverage Following IPOs

In Section III, we document the poor post-IPO operating performance of 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 these companies from going public.

The IPO ecosystem explanation for the decline of small-company IPOs notes 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 hundreds of firms. 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 companies per year, especially 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 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 being the same, in a higher market-to-book ratio and, for companies with positive EPS, a higher price-to-earnings ratio. Evidence from existing event studies shows 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), 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 (IBES) analyst recommendation database. Since IBES recommendation data started during 1993, and we examine the 3 years after issuing, the usable IPO sample in Table 5 is from 1994 to 2009. We augment the 1-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 data set by examining the IBES earnings forecast database.

TABLE 5

Analyst Coverage After the IPO

Table 5 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. Some 3,682 of the 4,075 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-12 month sales exceed $50 million in 2009 dollars. Analyst coverage data are from IBES and other sources. Here, "% covered by a lead in year 1" reports the percentage of IPOs in cohort year *t* that have at least one analyst report by a lead underwriter by the end of the first year after the issue date; "% covered in year 1" reports 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" reports the percentage of IPOs that have at least one analyst report in IBES in the second year after the issue, conditional on the IPO firm surviving into the second year; and "% covered in year 3" is defined similarly as "% covered in year 2." To mitigate the concern that IBES analyst coverage data are incomplete, we collect the IBES EPS forecast data on IPOs. If there is no recommendation but an analyst made an earnings forecast for a firm, we assume that the analyst also covered the firm.

IPO Year	No. 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	132	84.8%	93.2%	83.3%	73.5%	1.0
1995	173	94.8%	96.5%	82.1%	68.2%	1.0
1996	316	97.8%	99.1%	96.2%	83.5%	1.0
1997	193	94.8%	97.9%	95.3%	81.3%	1.0
1998	118	99.2%	100.0%	88.1%	75.4%	1.0
1999	313	100.0%	100.0%	91.7%	75.1%	1.1
2000	263	98.9%	99.6%	90.9%	73.0%	1.1
2001	22	95.5%	95.5%	90.9%	77.3%	1.4
2002	12	100.0%	100.0%	100.0%	83.3%	1.8
2003	12	100.0%	100.0%	91.7%	91.7%	1.4
2004	60	100.0%	100.0%	100.0%	91.7%	1.5
2005	40	95.0%	100.0%	100.0%	97.5%	1.7
2006	42	95.2%	100.0%	100.0%	90.5%	1.5
2007	50	96.0%	100.0%	94.0%	88.0%	1.6
2008	4	75.0%	100.0%	100.0%	75.0%	1.5
2009	4	100.0%	100.0%	100.0%	100.0%	2.5
Panel B. Large-Company IPOs (sales > $50m)						
1994	195	92.8%	99.5%	89.7%	73.8%	1.0
1995	211	93.4%	99.1%	89.6%	79.6%	1.0
1996	273	99.3%	100.0%	97.1%	85.7%	1.0
1997	216	100.0%	100.0%	97.7%	86.6%	1.0
1998	138	98.6%	100.0%	94.9%	81.2%	1.1
1999	144	97.9%	100.0%	93.1%	81.3%	1.2
2000	107	99.1%	100.0%	96.3%	87.9%	1.5
2001	55	98.2%	100.0%	98.2%	92.7%	1.6
2002	51	100.0%	100.0%	100.0%	92.2%	1.5
2003	48	97.9%	100.0%	95.8%	91.7%	1.6
2004	105	100.0%	100.0%	98.1%	96.2%	1.8
2005	114	98.2%	99.1%	94.7%	87.7%	1.9
2006	108	97.2%	100.0%	99.1%	89.8%	2.1
2007	105	97.1%	99.0%	98.1%	94.3%	2.0
2008	17	100.0%	100.0%	94.1%	94.1%	2.6
2009	37	100.0%	100.0%	100.0%	89.2%	3.0

If there is an earnings forecast, we assume that the analyst making the forecast also covers the stock.[12] 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 midpoint value lower than $8, there is usually little demand from institutional investors. Most of the 386 IPOs with a file price range midpoint of less than $8 are underwritten by low-prestige underwriters and frequently have no reported analyst coverage.

[12]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.

Table 5 reports four analyst coverage ratios for small- and large-company IPOs. For instance, in column 2, we report 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 percentages 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 years is calculated conditional on the firm still being CRSP-listed at the start of 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 IBES rather than a lack of analyst coverage in the earlier years. During 1994–2000, an (unreported) average of 96.6% of small-company and 96.8% of large-company IPOs receive 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 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. Of course, there is a selection bias issue: We do not observe the companies that did not 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 more analysts covering the firm and the probability of becoming an "orphan" with no coverage grows. Most importantly, for year 3 analyst coverage in column 5 of Table 5, there is no evidence during our sample period of a downtrend 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. Importantly, these patterns are inconsistent with the argument that the drop in analyst coverage on small firms has contributed to the near disappearance of small-company IPOs. Consequently, a lack of analyst coverage is not a plausible major cause of the decline in IPO volume.

VII. 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. The economies of scope hypothesis predicts a long-term steady decline in IPO volume, especially

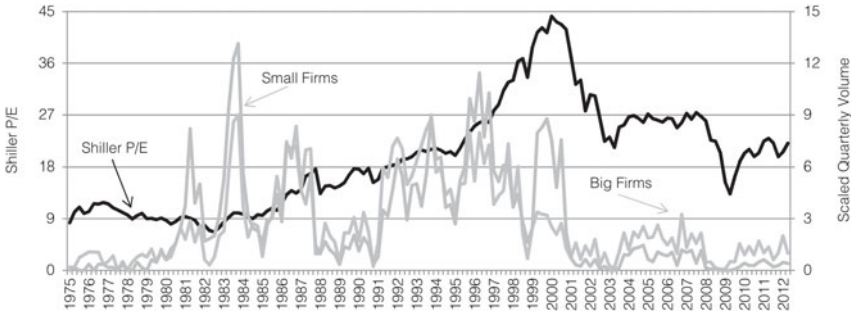
for small-company IPOs, whereas the regulatory overreach hypothesis predicts a discrete drop after SOX was implemented and/or a downtrend starting in May 1994, when bid-ask spreads began to fall.

Figure 4 depicts the time variation in the scaled quarterly volume of small- and large-firm IPOs over the 1975–2012 period. Figure 4 also shows the Shiller price-earnings (P/E) ratio, calculated as the ratio of the level of the Standard & Poor's (S&P) 500 divided by the average value of inflation-adjusted annual earnings over the prior 10 years. Inspection of Figure 4 shows that scaled IPO volume began to fall below what might be expected based on market valuations starting in 1997, and it did not recover following the stock market rally beginning in the spring of 2003.[13]

FIGURE 4

Scaled Quarterly IPO Volume and the Shiller Price-Earnings Ratio (1975–2012)

The Shiller P/E ratio is taken from Robert Shiller's Web site (http://aida.wss.yale.edu/∼shiller) and is computed as the ratio of the S&P 500 index divided by the inflation-adjusted 10-year moving average of S&P 500 earnings. Scaled IPO volume is quarterly IPO volume divided by annual real GDP, in trillions of 2009 dollars. Small- and big-firm IPOs are defined on the basis of $50 million in inflation-adjusted pre-IPO annual sales. Panel B of Table 6 reports the means and standard deviations of the scaled small- and big-firm IPO volume. IPOs are operating-company IPOs. The quarterly data are from the first quarter of 1975 to the fourth quarter of 2012.



To test the predictions of the regulatory overreach and economies of scope hypotheses, we estimate the following regression, where we use four measures of quarterly IPO volume as the dependent variable: *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:

$$
\begin{aligned}
(1)\quad \text{IPO Volume}_t \;=\; & \alpha + \beta_1 \text{Time trend} + \beta_2 \text{SOX dummy} \\
& + \beta_3 \text{Real GDP growth}_{t,t+3} + \beta_4 \text{Future NASDAQ return}_{t+1,t+4} \\
& + \beta_5 \text{Closed-end fund discount}_{t-4} + \beta_6 \text{Log M/B for small firms}_{t-2} \\
& + \beta_7 \text{NASDAQ return}_{t-2,t-1} + \beta_8 \text{IPO initial return}_{t-1} \\
& + \beta_9 \text{Percentage of small public firmswith negative EPS}_{t-1} \\
& + \beta_{10} \text{Quarter 1 dummy} + \varepsilon_t,
\end{aligned}
$$

$$
\varepsilon_t \;=\; \rho \varepsilon_{t-1} + u_t, \quad u_t \;\sim\; N(0, \sigma^2).
$$

[13] If the market-to-book ratio on Compustat- and CRSP-listed small firms (using $250 million of $2009 as the cutoff) is used instead of the Shiller P/E ratio, as we have done in unreported results, the patterns look very similar.

Panel A of Table 6 reports the quarterly time-series regression results using maximum likelihood estimation with a first-order autoregressive error term AR(1), estimated over the 1975–2011 period.[14] We scale IPO volume by real GDP in models 1–3 based on 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 LTM 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.

Our specification nests the economies of scope and regulatory overreach hypotheses. We use a time trend variable to capture the impact on scaled IPO volume of a gradual change in the importance of economies of scope and speed to the product market.[15] 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 0 before the third quarter of 2002 and equals 1 until after the fourth quarter of 2007, when small firms were given exemption from some compliance costs. This dummy variable is intended to capture the impact of SOX on IPO volume after SOX was enacted on July 30, 2002.[16]

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 log of the small firm market-to-book ratio, and lagged IPO average first-day returns), and a first-order autoregressive error term.[17]

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

[14]Data on small-firm earnings is not comprehensibly available before 1975, especially in the pre-NASDAQ years before Feb. 1972, when most IPOs were traded over the counter.

[15]Ideally, we would use a direct measure of the importance of economies of scope and scale. 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.

[16]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 SEC's 1997 Order Handling Rules, the implementation of Reg FD in Oct. 2000, decimalization occurring in 2001, and the Global Settlement in April 2003. See Weild and Kim (2008), (2009) for further details.

[17]The coefficients of approximately 0.50 on the autoregressive error term in our regressions using 1975–2011 data are substantially lower than the approximately 0.80 reported by Lowry ((2003), Table 3) using 1972–1996 data. Pástor and Veronesi ((2005), Table VI) report first-order autoregressive coefficients of over 0.80 for their 1960–2002 sample period. All three studies use scaled quarterly IPO volume as the dependent variable. The lower residual autocorrelation in our regressions is primarily due to our inclusion of a time trend, the use of a logged M/B ratio rather than an unlogged ratio, and deflating quarterly IPO volume by real GDP rather than the number of CRSP-listed firms.

TABLE 6

Quarterly Time-Series Regressions of Scaled IPO Volume (1975–2011)

Table 6 reports the results of maximum likelihood estimation of

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

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 from small firms. In 1977:Q3 and 1978:Q1, there were no IPOs, and we set the fraction of small IPOs to the previous quarter value, 0.17 and 0.60, respectively. *Time trend* equals 0.01 for the first quarter of 1980 and increases by 0.01 for each quarter onward until the fourth quarter of 2011. *SOX dummy* is a post-Sarbanes-Oxley dummy that equals 1 from the third quarter of 2002 to the fourth quarter of 2007, and 0 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 Jeffrey Wurgler's Web site (people.stern.nyu.edu/jwurgler) (in percentages). *Log 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 log of 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., 3–6 months prior to each IPO in quarter *t*). *NASDAQ return in* [*t* − 2, *t* − 1] is the NASDAQ Composite Index 6-month return (in decimals) in quarters *t* − 2 and *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. *Percentage of small public firms with negative EPS (%) in* (*t* − 1) is defined as in Table 2. *Quarter 1 dummy* is a first-quarter dummy that equals 1 in the first quarter of each year, and 0 otherwise. The Durbin-Watson statistics and the pseudo R^2s are also reported. The estimation results are based on 148 quarterly observations from the first quarter of 1975 to the last quarter of 2011.

Panel A. Quarterly Time-Series Analysis of IPO Volume

	Measures of 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	−7.51	−4.62	−3.12	−0.26
	(−2.02)	(−2.01)	(−1.74)	(−2.46)
SOX dummy	−0.45	−0.40	0.01	−0.06
	(−0.27)	(−0.40)	(0.01)	(−0.98)
Real GDP growth (%) in [*t*, *t* + 3]	0.47	0.24	0.22	0.01
	(2.29)	(2.01)	(2.18)	(1.29)
Future NASDAQ return in [*t* + 1, *t* + 4]	−5.14	−3.13	−2.02	0.03
	(−4.43)	(−4.63)	(−3.49)	(0.61)
Closed-end fund discount (%) in (*t* − 4)	−0.17	−0.12	−0.05	−0.01
	(−1.57)	(−1.85)	(−1.03)	(−1.76)
Log M/B for small firms in (*t* − 2)	3.33	1.96	1.32	0.24
	(2.82)	(2.82)	(2.25)	(5.01)
NASDAQ return in [*t* − 2, *t* − 1]	3.58	1.89	1.72	0.02
	(2.47)	(2.25)	(2.36)	(0.25)
IPO initial return in (*t* − 1)	−1.33	−1.53	0.07	0.08
	(−0.56)	(−1.10)	(0.06)	(0.69)
Percentage of small public firms with negative EPS in (*t* − 1)	0.11	0.06	0.06	−0.00
	(0.99)	(0.94)	(1.02)	(−0.86)
Quarter 1 dummy	−1.66	−0.69	−0.97	0.02
	(−4.84)	(−3.49)	(−5.59)	(1.08)
AR(1) coefficient, ρ	0.51	0.53	0.48	0.32
	(6.78)	(7.21)	(6.35)	(3.86)
Constant	3.69	2.23	1.34	0.49
	(0.85)	(0.86)	(0.63)	(3.02)
Pseudo R^2	78.7%	78.7%	75.0%	64.5%
Durbin-Watson	2.08	2.00	2.19	2.00

(continued on next page)

TABLE 6 (continued)
Quarterly Time-Series Regressions of Scaled IPO Volume (1975–2011)

Panel B. Means and Standard Deviations of Scaled IPO Volume

	No. of IPOs	No. of Small-Firm IPOs	No. of Large-Firm IPOs	Small-Firm IPOs/IPOs
Mean	5.46	2.74	2.71	0.41
Standard deviation	5.16	3.01	2.38	0.20

and total IPOs (model 4). For model 2, the coefficient of −4.62 (with a *t*-statistic of −2.01) 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 5.87 (−4.62 × 0.01 trend per quarter × 127 quarters) from the beginning of 1980.[18] Compared with a sample average of 2.74 for the scaled quarterly small-firm IPO volume (reported in Panel B of Table 6), the time trend is economically significant, with 352 (5.87 × 4 quarters per year × $15 trillion in GDP) fewer small-company IPOs in 2011 than would otherwise have occurred. For large-firm IPOs, the time trend coefficient of −3.12 (*t*-statistic = −1.74) implies a decline from 1980 to 2011 of 3.96 scaled IPOs per quarter, with 238 fewer large-firm IPOs in 2011 than would otherwise have occurred. The model 4 estimate of the time trend is also statistically significant and negative, corroborating the finding that small-firm IPOs exhibit a stronger downtrend than large-firm IPOs, in line with our hypothesis that the increased importance of economies of scale and scope exerts a greater adverse impact on small-firm IPOs.[19]

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 −0.40 and −0.06, with *t*-statistics of −0.40 and −0.98, respectively. Such a finding compliments our Table 4 evidence regarding international listings and the Figure 3 evidence on profitability changes, which suggests that the impact of SOX is insufficiently large to account for much of the observed decline in IPO volume. Weild and Kim (2009) also report evidence that U.S. IPO activity started to fall below what would be expected starting 5 years prior to the passage of SOX and the Global Settlement.

In sum, the regression evidence is supportive of the economies of scope hypothesis. In particular, the negative time trend estimates support our argument

[18] We choose 1980 as the beginning of the trend representing an increase in the speed of technological change based on evidence discussed in the *Economist* magazine's special report, "For Richer, for Poorer," in the Oct. 13, 2012 issue. In discussing the time trends in the intracountry and global Gini coefficients, on p. 9 of the survey the *Economist* states, "But around 1980 both these trends went into reverse."

[19] As an alternative to a simple time trend, in unreported results we also use a measure of the productive efficiency of big firms relative to small firms, computed on an annual basis as the equal-weighted average bias-adjusted frontier efficiency of big firms minus the average for small firms using firm-specific data supplied by Leverty and Qian (2010). This measure has an insignificant negative coefficient, consistent with fewer small-company IPOs when the efficiency of big firms is high in comparison to small firms. This measure, which is available only from 1988 to 2010, is positively correlated with the time trend.

that the increased importance of economies of scope and speed is a driver of the decline in IPO volume since the 1996 peak, especially for small firms, suggesting that small firms are particularly vulnerable to changes in technology.

VIII. Small-Company IPOs Underperform in the Long Run

Section III of this paper documents 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 we link it to the economies of scope and regulatory overreach hypotheses.

Table 7 tabulates the first-day return and three alternative measures of the 3-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 3-year anniversary or their delisting date. The buy-and-hold abnormal return $\text{BHAR}_{i,T}$ 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-adjusted):

$$\text{BHAR}_{i,T} = \prod_{t=1}^{\min(T,\,\text{delist})} (1 + R_{i,t}) - \prod_{t=1}^{\min(T,\,\text{delist})} (1 + R_{M,t}), \tag{2}$$

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.[20]

Table 7 reports that the average IPO from 1980 to 2009 underperforms its style-matched counterpart by 7.2% in the 3 years after going public. Inspection of the bottom two rows shows that small-company IPOs underperform their style-matched benchmark by an average of 17.3% during the 3 years after going public, whereas large-company IPOs outperform their style-matched benchmark by 3.1%. Furthermore, small-company IPOs underperform their style-matched benchmark in every subperiod. The underperformance relative to the

[20]For the style-matched returns, each IPO with a book-to-market ratio higher than 0 is matched with a nonissuing firm in the same size decile (using NYSE firms only for determining the decile break points) having the closest book-to-market ratio. Each IPO with a 0 or smaller book-to-market ratio is matched with a nonissuing firm of a book-to-market ratio of 0 or smaller having the closest market capitalization. For the IPOs, book-to-market ratios are calculated using the first recorded post-issue book value and the post-issue market cap calculated using the closing market price on the first CRSP-listed day of trading. For nonissuing firms, the Compustat-listed book value of equity for the most recent fiscal year ending at least 4 months prior to the IPO date is used, along with the market cap at the close of trading at month-end prior to the month of the IPO with which it is matched. Nonissuing firms are those that have been listed on the AMEX-NASDAQ-NYSE for at least 5 years, without issuing equity for cash during that time. If a nonissuer subsequently issues equity, it is still used as the matching firm. If a nonissuer gets delisted prior to the delisting (or the third anniversary), the second-closest matching firm on the original IPO date is substituted, on a point-forward basis. For firms with multiple classes of stock outstanding, market cap is calculated using the first closing market price and the total number of shares outstanding across all classes of stock as reported in Compustat. Seasoned firms with multiple classes of stock are excluded as potential matching candidates.

value-weighted market benchmark is even more severe for the small companies, and it is also present in every subperiod.

TABLE 7

Long-Run Returns on IPOs Categorized by the Pre-Issue Sales of the Firm

IPOs from 1980 to 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 or the delisting date. Buy-and-hold abnormal returns (BHAR) are defined in equation (2) in the text. The sample size is 7,440 firms. Small- and large-company IPOs are defined on the basis of whether the pre-IPO last 12-month 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 returns. Style adjustments use firms matched by market cap and book-to-market ratio with at least 5 years of CRSP listing and no follow-on equity issues in the prior 5 years. For post-issue 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 (48 IPOs), we use the market-adjusted return as the style-adjusted return. For IPOs with dual-class shares, the denominator of the post-issue book-to-market ratio is calculated using the post-issue number of shares for all share classes multiplied by the first closing market price of the publicly traded share class. All returns include dividends and capital gains, including the index returns.

			Average 3-Year Buy-and-Hold Return		
Sales	No. of IPOs	Average First-Day Return	Unadjusted	Market-Adjusted	Style-Adjusted
1980–1989	2,047	7.2%	22.6%	–22.5%	2.3%
Small	1,087	9.1%	12.0%	–34.4%	–2.3%
Large	960	5.1%	34.6%	–9.2%	7.7%
1990–1998	3,615	14.8%	39.8%	–20.9%	–0.5%
Small	1,784	18.5%	27.5%	–34.9%	–7.6%
Large	1,831	11.2%	51.8%	–7.4%	6.4%
1999–2000	858	64.4%	–53.3%	–31.9%	–58.9%
Small	603	72.3%	–69.2%	–47.3%	–67.0%
Large	255	45.7%	–15.8%	4.7%	–39.9%
2001–2009	920	11.9%	15.7%	3.9%	–6.0%
Small	273	8.6%	–10.0%	–19.5%	–30.3%
Large	647	13.2%	26.6%	13.7%	4.2%
1980–2009	7,440	18.1%	21.4%	–19.6%	–7.2%
Small	3,747	23.7%	4.8%	–35.6%	–17.3%
Large	3,693	12.4%	38.3%	–3.3%	3.1%

The underperformance of small-company IPOs is not restricted to the United States. Vismara et al. ((2012), Table 5) report an average 3-year buy-and-hold abnormal return of −27.5% for European IPOs during 1995–2008 with pre-IPO annual sales of less than €30 million.

Even though there are relatively few small-company IPOs during the 2001–2009 period, they nevertheless subsequently underperform by an average of 30.3% 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 during 2001–2009 continue to yield inferior returns for their public market investors.

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 7, however, reveals low long-run returns on 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 fewer offerings.

IX. Alternative Explanations: Litigation Risk and Public Market Valuations

Additional explanations for the decline in IPO activity beyond those that we discuss are offered by Angel (2011) and others.

A. Litigation Risk

The litigation environment in the United States 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.[21] Specifically, the average annual number of "classic" securities class actions in 1997–2000 is 210, while the average in 2001–2011 is 187.[22] Thus, we are unable to find evidence that increased litigation risk for public firms has a greater deterrent effect on potential IPOs in recent years than in the 1990s.

B. Public Market Valuations

Many articles document 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. Part of the high volume of IPOs in the late 1990s could thus be attributable to the unsustainably high market valuations on technology stocks. In our Table 6 time-series regressions, our main control for valuation levels is the natural logarithm of the market-to-book ratio for small stocks.

During the 11 years from 1990 to 2000, the quarterly average market-to-book ratio for small firms, lagged by two quarters, is 3.89. During the 11 years from 2001 to 2011, this same measure averages 3.16. Using the coefficient of 3.33 on the logged market-to-book ratio for small stocks in model 1 of our

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

[22] 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 it has no impact in other years. Classic lawsuits also exclude a total of 93 sell-side analyst lawsuits and mutual fund lawsuits, neither of which targets operating companies.

Table 6 regressions, the drop in the average market-to-book ratio implies $3.33 \times [\ln(3.89) - \ln(3.16)] = 0.692$ fewer IPOs per quarter per trillion dollars of real GDP, or 42 fewer IPOs per year with $15 trillion of annual GDP. Thus, the market conditions hypothesis can partly explain why IPO volume in 2001–2011 is lower than previously, but most of the decline is left unexplained.

Pástor and Veronesi (2005) develop a model in which firms receive a positive net present value (NPV) investment opportunity and wait for the optimal time to go public, resulting in an increase in IPO volume following market rises. Following market rises, there is a relatively low stockpile of firms waiting to go public, and several periods of low volume may follow. Their theoretical model, however, restricts the strategy space to either waiting or going public, with no option to sell out in a trade sale in order to realize the NPV before the investment opportunity disappears. Furthermore, the model would seem to predict i) large increases in IPO volume during the bull market starting in March 2003 and peaking in Oct. 2007, following a multiyear lull in IPO activity, and large increases in IPO volume in the bull market starting in March 2009 and continuing as of Dec. 2012, following another long lull in IPO activity; and ii) many IPOs beginning a few years after the huge capital commitments made to venture capital funds in 2000.

In Table A-2 of the Internet Appendix, we expand our Table 6 regression model to include two additional variables: i) the interaction of the lagged one-quarter NASDAQ return and a dummy variable for whether IPO volume during the previous eight quarters had been low, and ii) the average value of capital commitments made to venture capital funds scaled by GDP in years -3 to -6. Inspection of the table discloses very modest explanatory power for these variables, and the coefficient on lagged VC activity is insignificantly negative instead of being positive (more VC investment should result in more IPOs a few years later). The downtrend in small-company IPO volume predicted by the economies of scope hypothesis persists, although it becomes less significant due to the high correlation of the time trend and lagged VC activity ($\rho = 0.71$). Thus, the Pástor and Veronesi (2005) market conditions model is not effective at explaining the IPO drought that began in 2001 that, as of 2013, shows no signs of ending.

C. Other Multiyear Droughts in IPO Activity

The 2001–2012 IPO drought in the United States is not the first multiyear drought in IPO activity. As documented in Gompers and Lerner (2003) and Pástor and Veronesi (2005), during 1930–1945 there were very few IPOs in the United States, as was the case in 1963–1967 and 1973–1980. If long droughts are common, why is a new explanation needed for the 2001–2012 drought?

The drought of the 1930s and 1940s, we would conjecture, is easily explained by the Great Depression and World War II, a period in which inflation-adjusted stock prices were continuously at less than half of their 1929 levels.[23] The 1973–1980 drought also saw inflation-adjusted stock prices at 40% or more below their 1972 levels. Unlike the other two droughts, stock prices were not

[23] See Robert Shiller's Web site (http://aida.wss.yale.edu/∼shiller), where the ratio of the S&P 500 to the Consumer Price Index (CPI) is reported on a monthly basis.

depressed in the 1963–1967 drought, which saw an average of 63 IPOs per year, according to Gompers and Lerner ((2005), Table 1). U.S. real GDP was less than one-third as large in 1963–1967 as in 2001–2012, however, so the 1963–1967 drought still had the equivalent of 200 IPOs per year, and it only lasted for 5 years. In addition to the length of the current drought, a further difference with the droughts of the 1960s and 1970s is that, unlike today, there was no large private equity industry looking for exits for their portfolio companies. Thus, the current IPO drought is fundamentally different than the prolonged droughts of 1930–1945 and 1973–1980, when a depressed stock market was associated with low IPO volume.

X. Conclusions

During 1980–2000, an average of 310 IPOs occurred each year in the United States, but this has fallen to an average of only 99 IPOs per year during 2001–2012. Even more dramatically, an average of 165 small-company (pre-IPO inflation-adjusted annual sales of less than $50 million) IPOs occurred each year, and this number has dropped by more than 80% to an average of only 28 deals per year during 2001–2012.

Many commentators argue 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 why small-company IPOs have been uncommon in the United States since 2000. 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, this regulatory overreach hypothesis is unable to explain many facts, and many of its predictions are not supported.

Our economies of scope hypothesis posits that there has been a fundamental change in many sectors of the economy whereby the importance of bringing products to market quickly has increased. Our explanation predicts that independent small companies will have lower profits relative to their 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 greater value is created in a sale to a strategic buyer in the same or a related industry.

We report that among small firms, the percentage of IPOs from the prior 3 years that are unprofitable was below 60% in every year from 1980 to 1997 and has been above 60% in every year since then. 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 3 years after going public, compared to outperformance of 3.1% 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. 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 scale and scope via making acquisitions or by 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. Furthermore, a dummy variable for the period after SOX was implemented in July 2002 is economically and statistically indistinguishable from 0, 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, IPO volume is unlikely to return 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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