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Going-Private Decisions and the Sarbanes-Oxley Act of 2002

A Cross-Country Analysis

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Preface

This article investigates whether the passage and the implementation of the Sarbanes-Oxley Act of 2002 (SOX) drove firms out of the public capital market. To control for other factors affecting exit decisions, we examine the post-SOX change in the propensity of public American targets to be bought by private acquirers rather than public ones with the corresponding change for foreign targets, which were outside the purview of SOX. Our findings are consistent with the hypothesis that SOX induced small firms to exit the public capital market during the year following its enactment. In contrast, SOX appears to have had little effect on the going-private propensities of larger firms.

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The Sarbanes-Oxley Act of 2002 was enacted after a series of corporate failures that had shaken public confidence in public securities markets. The Act (along with its regulatory implementation, to which we refer collectively as "SOX") introduced significant changes in the governance, accounting, auditing, and reporting environment of firms traded in American securities markets. Its most notorious mandate is a requirement under Section 404 to include in the annual report an attestation by an outside auditor to the effectiveness of the firm's internal controls over financial reporting. Additional mandates, among many others, include a requirement that the chief executive officer and the chief financial officer certify the accuracy of the firm's periodic reports and the effectiveness of its internal controls, a requirement that the firm have an audit committee composed exclusively of independent directors, and a ban on the outside auditor from providing certain non-audit services to the firm.

Since the enactment of SOX, researchers have begun isolating and studying its effects. Some studies have found, for example, that SOX was associated with a decline in the rate of incentive compensation, research and development expenses, and capital expenditures (Cohen et al. 2007). There is also evidence that SOX was associated with a reduction in accrual-based earnings management (Cohen et al. 2008). Nevertheless, the overall effect of SOX on publicly traded firms remains in dispute. Proponents of SOX argue that it facilitates access to the public capital market by alleviating investor concerns (Cunningham 2003; Coates 2007). Opponents argue that it unduly raises the cost of being public (Ribstein 2002; Gordon 2003; Romano 2005).

Of particular interest in this debate is whether SOX disadvantages small firms by applying to them the same standards it applies to large firms. Responding to this concern, the Securities and Exchange Commission (SEC) has granted firms with market capitalization

below $75 million several deadline extensions — first in June 2003 and most recently in December 2006 — to comply with the most onerous SOX requirement, an annual duty to evaluate the effectiveness of internal controls over financial reporting. Thus far, however, the SEC has stopped short of crafting special carve-outs for these firms despite a recommendation to do so by an SEC committee (Advisory Committee on Small Public Companies 2006).

In this article, we test whether the net cost of complying with SOX has driven firms in general, and small firms in particular, to exit the public capital market. Many other attempts to address this question have had difficulty controlling for unobserved conflating factors that could have affected exit decisions around the enactment of SOX. We address this difficulty using a difference-in-differences empirical strategy. This approach compares changes over time in two populations: one subject to a policy intervention (treatment group), and the other not (control group). To evaluate the impact of the intervention on outcome, one needs to compare the outcome change for the treatment group with the outcome change for the control group. Assuming the two groups are similar in all relevant respects other than their exposure to the intervention, this approach screens out changes not related to the intervention.

The primary outcome variable in our analysis is a public target's probability of being bought by a private acquirer rather than a public one, the treatment group is American targets, and the control group is foreign targets. To evaluate the effect of SOX, we compare the change in the propensity of American public targets to be bought by private acquirers rather than by public acquirers to the corresponding change for foreign public targets. The difference between the two changes — the difference in differences — is the change we attribute to SOX.

We predict that any effect of SOX on going-private transactions will be most pronounced for small firms, for two related reasons. First, small firms are more likely than large firms to be sold in response to SOX because they derive relatively smaller net benefits from being public and thus stand closer to being sold when there is an increase in the cost of being public, especially if the increase is relatively larger for them. The acquirers in these acquisitions, in turn, tend to be financial acquirers, which are typically private. Second, at least some of the costs of complying with SOX, such as ensuring the effectiveness of internal controls over financial reporting, are firm-specific and thus not avoidable by a sale to another public firm. Accordingly, if SOX imposes a relatively larger net cost on small firms, these firms will lose more of their appeal to public acquirers than will larger firms.

Our results are consistent with this prediction. When we examine acquisitions as a whole, we find no relative increase in the rate of acquisition by private acquirers (going private) among American firms. When we differentiate between acquisitions based on firm size, however, we find a relative increase in the rate of going private by small American firms. Moreover, when we differentiate between acquisitions based on their proximity to the enactment of SOX, we find a relative increase in the rate of going private by American firms in the first year after the enactment. Finally, when we differentiate between acquisitions based on both firm size and the proximity of the acquisition to the enactment of SOX, we find that the increase in the rate of going private by small American firms is concentrated in the first year after the enactment.

The dampening of the SOX effect in the second year after SOX was enacted is consistent with more than one interpretation. Our preferred interpretation is that maladapted firms realized their susceptibility to the new regime and went private promptly, before the full

panoply of its requirements applies to them, leaving behind public firms that were better suited to the new regulatory environment.

A second interpretation is that SOX imposed on firms a large upfront cost and a low recurring cost. This interpretation is consistent with the facts that some of the new mandates took effect immediately, and that it took time for the SEC to clarify in rules the new mandates and for a market for SOX consulting services to develop. It is at odds, however, with the fact that the most costly component of SOX — an annual report on the effectiveness of internal controls — took effect only in late 2004 and exceeded early cost estimates. Indeed, this component of SOX has yet to be applied to small firms — the very firms whose propensity to go private increased after the enactment of SOX.

A third interpretation is that over time other countries have also tightened the regulation of public firms, bringing going-private rates closer to the American level.[1] This interpretation, however, in unlikely to fully explain the disappearance of the SOX effect after a year, as we are unaware of foreign reforms similar in scope to SOX at that time.[2]

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[1] In July 2003, for example, the United Kingdom required public firms to establish independent audit committees with at least one financial expert to monitor their internal controls (Financial Services Authority 2003).

[2] We do not separate the effect of SOX from the effect of other mechanisms of heightened scrutiny to which public firms in the United States became subject around its enactment. SOX was a response to the end of the technology bubble of the late 1990s and the spate of corporate scandals that followed. But it was not the only response. Within the United States, courts, regulators, stock exchanges, and investors all intensified their scrutiny of public firms in additional ways. Each of these non-SOX changes could have raised the cost of being public. Our study compares the combined effect of SOX and these related changes to that of contemporaneous trends abroad.

Our analysis proceeds as follows. Section 1 discusses the literature on the effects of SOX. Section 2 outlines our theoretical framework and empirical strategy, and describes our data. Section 3 reports our results. Section 4 performs a number of robustness checks. Section 5 concludes.

1. Related Literature

Existing empirical studies of the impact of SOX follow three approaches.[3] One set of studies assess the accounting and audit costs imposed by SOX. These studies do not measure the net effect of SOX on the viability of being public. Carney (2006) reviews some of the studies. Their common theme is that public firms' accounting and audit costs have increased substantially since SOX and exceeded early estimates. Eldridge and Kealey (2005) find that the audit costs associated with SOX increase in assets, asset growth, and effectiveness of internal controls, but the ratio of these costs to assets decreases in assets.

Another set of studies estimate abnormal stock returns associated with events leading to the enactment of SOX. While the results of these studies are mixed about the overall effect of SOX, they suggest that SOX imposed a disproportionate cost on small firms. Zhang (2007) finds negative returns. Jain and Rezaee (2006) and Li et al. (2008) find positive returns but a negative relation between returns and practices that SOX sought to limit. Engel et al. (2007) find that returns are positively related to market capitalization and stock turnover but do not report whether returns are positive or negative. Chhaochharia and Grinstein (2007)

[3] Kamar et al. (2007) provide a detailed review of the literature.

find that small firms with ineffective internal controls or boards that are not independent (which are more affected by SOX) underperform small firms with effective internal controls or independent boards (which are less affected). In contrast, they find no difference in performance for large firms whose internal controls are ineffective, and find that large firms whose boards are not independent outperform similar firms whose boards are independent. Wintoki (2007) finds that returns are positively related to firm size and age and negatively related to market-to-book ratio and to expenditure on research and development. Litvak (2007a) finds in a study of foreign firms cross-listed in the United States that small firms and large firms experience similar negative returns. Litvak (2007b) finds that small firms react more negatively when measuring the effect using Tobin's Q.

A final set of studies, the closest in their approach to this article, examine the effect of SOX on deregistration. Public firms can deregister their stock with the SEC and thereby opt out of federal securities law by selling all of their stock to a private acquirer (going private) or cashing out small shareholders to lower the number of shareholders below 300 (going dark). Unlike going dark, going private can achieve a number of business goals other than avoiding federal securities law (Jensen 1989; Kaplan 1989a, 1989b; Baker and Wruck 1990; Lichtenberg and Siegel 1990; Smith 1990). Consistently, existing studies suggest that going-dark transactions are more clearly affected by SOX than going-private transactions. Block (2004) reports that the most commonly cited reason for going private or going dark, especially by small firms and after the enactment of SOX, is the cost of being public. Engel et al. (2007) find a small post-SOX increase in deregistration, which becomes insignificant when going-dark transactions are excluded. Leuz et al. (2008) find a post-SOX increase in going dark, but

no significant increase in going private. They also find that distress predicts going dark before the enactment of SOX, while agency costs predict going dark after its enactment.

The deregistration studies do not separate the effect of SOX from that of contemporaneous factors that can increase the rate of going private or going dark. One such factor is financial market liquidity, which can affect the willingness of public and private investors to pursue acquisitions. This factor applies mainly to going-private transactions because they require more cash than going-dark transactions. Another factor, applicable to both types of transactions, is the weakness of the public capital market. Firms are more likely to leave the public capital market when stock prices are depressed (Maupin et al. 1984; Lerner 1994; Pagano et al. 1998; Benninga et al. 2005). Both of these factors were present around the enactment of SOX.[4]

2. Theoretical Framework, Empirical Strategy, and Data

A. Theoretical Framework

In light of the difficulties noted above, our framework is based on a difference-in-differences approach in which we compare the post-SOX change in the probability that American public firms undergoing an acquisition be acquired by a private acquirer to the

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[4] Holstein (2004), MacFayden (2002, 2003, 2004), and Carney (2006) report that the ready availability of private equity financing around the enactment of SOX fueled going-private transactions. Block (2004) reports that almost 40% of firms that either went private or went dark after the enactment of SOX cited as the primary reason not the cost of being public under SOX, but rather pressure and time constraints for top management, lack of coverage by security analysts, absence of liquidity in the public capital market, absence of opportunity for a secondary market, or threat of delisting by Nasdaq.

correspondent change for foreign firms, while controlling for the level of stock prices in the country of primary listing when the transaction is announced. This study design separates the effect of SOX from the effect of contemporaneous market conditions in two ways. First, it contrasts the United States with other countries, which were not directly affected by SOX. Second, it contrasts going-private transactions with acquisitions by public acquirers. The disadvantage of this study design is that it does not measure the rate of going-dark transactions which, as noted above, are an alternative way to escape SOX.

As formally developed in the Appendix, SOX could increase the probability that public firms be acquired by private acquirers rather than public ones in two ways.

First, the cost of complying with SOX could trigger the sale of firms that would not be sold otherwise. These sales would tend to involve so-called financial acquirers, which invest in targets, often with target management participation, to sell them later at a profit. Financial acquirers are distinguished from so-called strategic acquirers, which aim to integrate the operations of targets with their own, and are therefore less sensitive to price. Importantly, for reasons unrelated to SOX, most financial acquirers are privately owned. We refer to this explanation as the "new sales hypothesis". As the Appendix demonstrates, this hypothesis requires a sufficiently dense population of private acquirers (relative to the population of public acquirers) ready to buy firms that pursue a sale to avoid the cost of complying with

SOX. This condition is plausible for financial acquirers because, unlike strategic acquirers, they need not fit the target with operations of their own.[5]

Second, the cost of complying with SOX could also cause a shift in the composition of acquirers of firms that would be sold for any reason. According to this theory, post-SOX acquisitions would tend to involve private acquirers more than pre-SOX acquisitions because private acquirers retain none of the target's SOX obligations after the acquisition, while public acquirers do. The enactment of SOX should therefore reduce the price that public acquirers would pay in the acquisition relative to private acquirers. We refer to this explanation as the "all sales hypothesis".

The post-SOX increase in the probability of being sold to a private acquirer could be more pronounced for small firms because their costs of being public, especially after adding the costs of complying with SOX, are relatively higher, and their benefits from being public are relatively lower, than those of large firms (Pagano and Röell 1998; Pagano et al. 1998). Accordingly, as we explain further below, both the "new sales hypothesis" and the "all sales hypothesis" predict that the effect of SOX on the type of acquirers buying public firms will be most noticeable in small firm acquisitions.

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[5] The sale of Toys "R" Us to financial acquirer KKR, which began in an attempt to sell one of the firm's divisions (Global Toys), is a useful illustration: "[The firm's investment bank] First Boston contacted 29 potential buyers for Global Toys . . . None of the 29 potential buyers was a so-called "strategic buyer" and apparently for good reason. At oral argument and in their briefs, the plaintiffs have been unable to identify any existing retailer that would have a plausible strategy for combining itself in a synergistic manner with Global Toys . . . The 29 financial buyers First Boston contacted are a "who's who" of private equity funds." *In re Toys "R" Us, Inc., Shareholder Litigation*, 877 A.2d 975, 987 (Del. Ch. 2005).

The cost of filing periodic reports is a case in point. Even before SOX, small firms lacked the scale economies that large firms enjoy in preparing these reports. The requirement of Section 404 of SOX that periodic reports also evaluate the internal controls of the reporting firm deepened this disadvantage (Holmstrom and Kaplan 2003). According to one newspaper editorial, "while Section 404 costs the average multibillion-dollar firm about 0.05% of revenue, the figure can approach 3% for small companies" (Wall Street Journal 2005). The new burden was especially heavy for small firms because, unlike large firms, many of them lacked accounting staff to monitor the effectiveness of their internal controls. Consistently, Doyle et al. (2007) find that small firms are more likely to have ineffective internal controls than large firms, and Eldridge and Kealey (2005) find that the increase in audit fees in the first year of complying with SOX is higher for firms with ineffective internal controls and is higher relative to assets for small firms.

At the same time, small firms gain from being public relatively less than large firms. The financial press routinely stresses this point. The Economist (2003), for example, reports increasing marginalization of small firms in the public capital market. Similarly, Deutsch (2005) notes that small firms often derive low benefits from being public due to limited market attention and liquidity, and quotes the president of Corfacts, a small telemarketing firm that left the public capital market in 2004, explaining: "We have been unable to gain a significant following in the market, yet we have been spending large sums of money for accounting and legal services needed to maintain our reporting status." By comparison, Deutsch (2005) notes, leaving the public capital market is "not an option for huge companies" because "their identities and structures are inextricably linked with their status as publicly

listed entities." Consistently, Jain et al. (2008) find that large firms experienced a larger increase in stock market liquidity after the enactment of SOX than small firms.

The differences between small firms and large firms in the costs and benefits of being public can make small firms more likely to go private in response to SOX both under the "new sales hypothesis" and under the "all sales hypothesis".

First, because small firms derive relatively smaller net benefits from being public, they stand closer to being sold in response to any increase in the costs of being public, especially when the increase itself is relatively larger for them. As noted above, this sale will likely involve a financial acquirer, which is typically private, rather than an acquirer aiming to integrate the target's business with its own, which can be either private or public. In other words, SOX is likely to cause small firms to gravitate towards private acquirers under the "new sales hypothesis".

Second, to the extent that small firms' relatively higher costs of complying with SOX are firm-specific and therefore not avoidable by a sale to other public firms, SOX should reduce the price public acquirers would pay for small firms relatively more than it reduces the price these acquirers would pay for large firms. The duty to establish internal controls under Section 404 of SOX is again a case in point. As Aquila and Golden (2002), Walton and Greenberg (2003), Glover and Krause (2004), and Klingsberg and Noble (2004) explain, because the acquirer will assume responsibility for these controls after the acquisition at uncertain costs, it will demand that they pass muster in advance. The relatively higher cost that small firms incur to establish internal controls thus cannot be avoided through a sale to a public acquirer even though the acquirer has established its own internal controls. Put

differently, SOX is likely to cause small firms to gravitate towards private acquirers also under the "all sales hypothesis".

B. Empirical Strategy

Our basic empirical specification for estimating the difference between the post-SOX change in going private in the United States and the corresponding change abroad is a probit model in which the dependent variable is an indicator for whether the acquirer is private and the independent variables are an indicator for acquisitions announced after the enactment of SOX (*After*), an indicator for targets primarily traded in the United States (*US*), and an interaction between *After* and *US*. This interaction is the key variable. Accordingly, we estimate the parameters of the probit specification

$$y_{ikt} = \alpha_0 + \alpha_1 US_i \times After_t + \alpha_2 US_i + \beta x_{kt} + \gamma z_i + \delta_k + \eta_t + \varepsilon_{ikt}, \quad (1)$$

where i is a specific acquisition, k is the stock exchange, t is the time of announcement, y_{ikt} is an indicator for being acquired by a private acquirer rather than by a public acquirer, US_i is an indicator for targets primarily listed in the United States, $After_t$ is an indicator for acquisitions announced after July 31, 2002, x_{kt} is the log of the normalized stock index of the target's country of primary listing at announcement, z_i is an indicator for target's 2-digit SIC code industry, δ_k comprises stock exchange fixed effects, η_t comprises quarter fixed effects, and ε_{ikt} is an error term.

We include several controls for unobserved market characteristics affecting going private decisions. Following Bertrand and Mullainathan (1999), Gruber (2000), Athey and

Stern (2002), and Donohue et al. (2002), we assume that these characteristics can be decomposed into a fixed component specific to each market and a component that changes over time but is common to all markets. Accordingly, we modify the specification to include stock exchange fixed effects, single-digit SIC industry fixed effects, and calendar quarter fixed effects. We capture some market-specific changes by adding the log of the normalized stock index of the target's country of primary listing at announcement.[6] Following Bertrand et al. (2004), we cluster standard errors at the country in which the stock exchange is located to account for potential serial correlation.

We extend the basic model to allow the coefficient of *US* × *After* to differ between small and large targets, and between acquisitions announced in the first year after the enactment of SOX and acquisitions announced thereafter.[7]

C. Data

Our primary data source is Thomson's Securities Data Company Platinum database (SDC). The initial sample includes all transactions involving public targets announced between January 1, 2000 and December 31, 2004 other than spinoffs, recapitalizations, self-

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[6] The results are robust to adding as controls other financial statistics (by month, year, and country) published by the International Monetary Fund, such as the central bank deposit rate, the lending rate, the treasury bill rate, and the money market rate.

[7] In principle, this framework could be expanded to a nested set of decisions, with the first decision concerning whether to be sold and the second decision concerning the type of acquirer. Because of data restrictions, we focus on the second decision by investigating firms' propensity to be sold to private acquirers rather than public ones conditional on being sold. In Section 3, however, we return to the first decision by investigating whether the number of acquisitions increased after the enactment of SOX.

tenders, exchange offers, repurchases, and privatizations. We classify an acquirer as private when both it and its ultimate parents are private. We classify a target as public when it is traded on an established public stock exchange, and classify it as an American public firm when it is primarily traded on any such market in the United States other than Pink Sheets. We do not treat firms traded on Pink Sheets as American public firms because many of these firms are not registered with the Securities and Exchange Commission and are therefore not subject to SOX. The American public firms in our sample are traded on American Stock Exchange, Boston Stock Exchange, Nasdaq, New York Stock Exchange, OTC Bulletin Board, and Philadelphia Stock Exchange.

SDC does not identify which of the firms primarily traded abroad are also traded in the United States. Because these firms are subject to some of the provisions of SOX, an inability to identify them biases our results toward zero. This weakening should nevertheless be minimal because cross-listed firms, which tend to be large, are unlikely to give up their access to the public capital market abroad just to avoid SOX. Rather, as Whoriskey (2005) reports, they are likely to go dark in the United States while maintaining their listing abroad.

Our initial sample contains 19,947 announced acquisitions between January 2000 and December 2004. We exclude, in the following order, 1562 withdrawn acquisitions, 413 acquisitions of American firms by foreign public firms or their subsidiaries (which, despite being direct or indirect acquisitions by public acquirers, would relieve the targets of their SOX duties), 711 acquisitions of foreign firms by American public firms or their subsidiaries (which, despite being acquisitions of public firms, would bring the targets into the ambit of SOX), 29 acquisitions by the targets themselves, 3200 acquisitions of firms partially owned by public firms (which would not relieve the parent firms of their SOX duties even if made by

private acquirers), 661 acquisitions of targets whose primary stock exchange is unknown, 854 acquisitions whose status is "Intended", "Rumor", "S buyer" (seeking buyer), or "Unknown", 786 acquisitions lacking information about the percentage of target stock sought to be owned by the acquirer after the transaction, 3933 acquisitions lacking information about the target's stock market value, 4933 acquisitions by acquirers seeking to own only part of the target's stock (because the targets of such partial acquisitions remain public — and subject to SOX — even when the acquirer is private), and 208 acquisitions of firms primarily listed on stock exchanges with fewer than 20 acquired firms in the sample period (to reliably differentiate between small and large firms within each stock exchange).[8]

We record each target's primary stock exchange, single-digit Standard Industry Classification (SIC) code, stock market value four weeks before the announcement of the acquisition, and announcement date — all as provided in SDC. The foreign firms in our sample are primarily traded in one of 17 countries.[9] We scale the stock market value of the firm by the United States Consumer Price Index (CPI) in the month in which the transaction was announced.

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[8] To the extent that, SOX aside, partial acquisitions and full acquisitions are affected by similar economic conditions, partial acquisitions can serve as a useful comparison group (in addition to foreign acquisitions) for isolating the effect of SOX. In unreported regressions, we included partial acquisitions in the sample and distinguished between them and full acquisitions, finding no effect for partial acquisitions or an opposite effect to the one we found for full acquisitions.

[9] The countries are Australia, Canada, Denmark, France, Germany, Hong Kong, India, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, South Africa, Sweden, Thailand, and United Kingdom.

We complement the SDC data with the Morgan Stanley Capital International, Inc. (MSCI) stock index data. MSCI provides monthly stock indexes for developed and emerging countries. For each transaction, we compute the normalized stock index of the target's country of primary listing at announcement, defined as the ratio of the value of the stock index in the target's country of primary listing when the acquisition was announced to the value of that index in January 1999.

3. Results

Table 1 reports summary statistics. After the enactment of SOX, the percentage of small targets, defined as firms whose market value is in the bottom quartile of their primary stock exchange over the sample period (the mean threshold is about $18 million and the standard deviation is about $10 million), increases by 36% in the United States (from 22% to 30%), while increasing by 13% abroad generally (from 24% to 27%) and by 8% (from 25% to 27%) in Canada and Western Europe, whose markets are arguably more integrated with the American market than other markets. The percentage of acquisitions by private acquirers also increases in the United States more than abroad. Focusing on acquisitions of small targets, this percentage increases by 35% (from 40% to 54%) in the United States, while increasing by 2% (from 45% to 46%) abroad generally and by 13% (from 53% to 60%) in Canada and Western Europe. Taken as a whole, these summary statistics are consistent with the hypothesis that SOX increased the probability that small firm acquisitions involve private acquirers. The results reported below provide additional evidence consistent with this hypothesis.

Table 1: Full Acquisitions of Public Targets Announced Between January, 1 2000 and December 31, 2004

Panel A: Acquisitions Announced Between January 1, 2000 and July 30, 2002			
	United States	W. Europe & Canada	All Abroad
Number of observations	974	441	724
Market value ($1,000,000)			
Mean	827	557	525
Standard deviation	4753	2069	2221
% small targets	22	25	24
% private acquirers	23	45	37
% private acquirers among small targets	40	53	45
Panel B: Acquisitions Announced Between August 1, 2002 and December 31, 2004			
	United States	W. Europe & Canada	All Abroad
Number of observations	679	319	712
Market value ($1,000,000)			
Mean	475	616	388
Standard deviation	1895	3251	2232
% small targets	30	27	27
% private acquirers	32	42	42
% private acquirers among small targets	54	60	46

We start with testing whether the number of acquisitions of public targets traded in the United States increases after the enactment of SOX relative to the corresponding change abroad. Specifically, we compare the number of acquisitions announced per quarter in the United States and abroad in a sample of acquisitions announced up to a year after the enactment of SOX using an ordinary least squares regression model, while distinguishing between small targets and large ones.

Table 2 reports the results. The difference-in-differences estimate is positive and significant for small firms, consistent with the notion that anticipated SOX compliance costs

drove small target acquisitions in the first year after the enactment. In terms of economic significance, the coefficients reported in Column (2) indicate a 38% post-SOX increase in the average number of small target acquisitions per quarter in the United States from 21 to 29. In contrast, the difference-in-differences estimate is negative and significant for large targets. The results are robust to replacing *After* by quarter fixed effects and replacing *After* × *Small* by the interaction of quarter fixed effects with *Small*. In unreported regressions for a sample period ending on December 31, 2004, the difference-in-differences estimate for small firms becomes smaller and insignificant, while the difference-in-differences estimate for large firms becomes smaller but remains significant.

Table 2: Number of Full Acquisitions Announced Through June 30, 2003
SOX Effect Is Differentiated by Target Size

This table reports the results of estimating an ordinary least squares regression in which the dependent variable is the number of acquisitions announced per quarter, per country, and per size category (small/large). Panel A reports coefficient estimates and, in parentheses, standard errors clustered at the country in which the targets have their primary listing. Panel B reports difference-in-differences estimates and, in parentheses, the significance (*p*-value) of these estimates based on Wald tests. US is an indicator for acquisitions of targets primarily listed in the United States. Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of stock market value distribution in the target's primary stock exchange in the sample period. After is an indicator for acquisitions announced after July 31, 2002. Quarter fixed effects are based on the quarter and year in which the acquisition is announced. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates				
	(1)		(2)	
	Coeff.	Std. Error	Coeff.	Std. Error
US	65.29 ***	(3.23)	65.47 ***	(3.47)
Small	–2.92 **	(1.11)	2.43	(3.02)
US × Small	–50.99 ***	(1.11)	–51.10 ***	(1.15)
US × After	–32.36 ***	(0.52)	–32.51 ***	(0.57)
US × After × Small	40.74 ***	(0.60)	40.91 ***	(0.59)
After	–0.99 *	(0.52)	–	
After × Small	1.66 **	(0.60)	–	
Quarter fixed effects	–		Included	
Quarter fixed effects × Small	–		Included	
Country fixed effects	Included		Included	
Number of observations	315		315	

Panel B: Difference-in-Differences Estimates				
	Coeff.	p-value	Coeff.	p-value
Acquisitions of small targets				
US × After + US × After × Small	8.38 ***	(0.00)	8.40 ***	(0.00)
Acquisitions of large targets				
US × After	–32.36 ***	(0.00)	–32.51 ***	(0.00)

Next we examine whether SOX increased the probability that small target acquisitions involve private acquirers. We begin our analysis by estimating the model in Equation (1), which does not distinguish between acquisitions according to target size or the proximity of the acquisition to the enactment of SOX,

Table 3 reports the results. The Wald tests reported in the table do not reject the null hypothesis that SOX did not affect acquisitions.

Table 3: The Probability of Being Acquired by a Private Acquirer

This table reports the results of estimating a probit model in which the dependent variable is being acquired by a private acquirer rather than by a public acquirer. Panel A reports coefficient estimates and, in parentheses, standard errors clustered at the country in which the target has its primary listing. Panel B reports difference-in-differences estimates and, in parentheses, the significance (*p*-value) of these estimates based on Wald tests. US is an indicator for acquisitions of targets primarily listed in the United States. Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of stock market value distribution in the target's primary stock exchange in the sample period. Log of country stock index is the log of the normalized stock index of the target's country of primary listing at announcement. After is an indicator for acquisitions announced after July 31, 2002. Quarter fixed effects are based on the quarter and year in which the acquisition is announced. The regressions include unreported stock exchange fixed effects based on the stock exchange on which the target is primarily listed, and unreported industry fixed effects based on the single-digit SIC code of the target. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates		
	Coeff.	Std. Error
US	–0.72 ***	(0.12)
US × After	0.07	(0.06)
Log of stock price index	–0.31	(0.27)
Quarter fixed effects	Included	
Industry fixed effects	Included	
Country fixed effects	Included	
Number of observations	3089	

Panel B: Difference-in-Differences Estimates		
	Coeff.	p-value
US × After	0.07	(0.25)

To test the hypothesis that SOX affected small firms more than others, we estimate a model similar to Equation (1) while distinguishing between large targets and small targets. We do so by adding an indicator (*Small*) for targets with market value in the bottom quartile of their primary stock exchange and the interaction terms *US* × *Small* and *US* × *After* × *Small*.

Table 4 reports the results. As before, Column (1) assumes that all acquisitions are affected by the same changes in unobserved economic conditions over time. Column (2) relaxes this assumption by adding to the regression model a set of quarter fixed effects interacted with *Small*. Column (3) relaxes the assumption that the stock exchanges in our sample undergo the same unobservable changes over time. Following Athey and Stern (2002), this is done by adding to the regression model a set of quarter fixed effects interacted with the log of the normalized stock index of the target's country of primary listing at announcement. In all of the columns, the difference-in-differences estimate is positive and significant for acquisitions of small targets, consistent with SOX driving small firms to exit the public capital market. In contrast, the difference-in-differences estimate is insignificant for acquisitions of large targets. In terms of economic significance, the coefficients reported in Column (2) predict a significant increase from 0.40 to 0.54 in the probability that an acquisition of a small target involve a private acquirer after the enactment of SOX.

Table 4: The Probability of Being Acquired by a Private Acquirer SOX Effect Is Differentiated by Target Size

This table reports the results of estimating a probit model in which the dependent variable is being acquired by a private acquirer rather than by a public acquirer. Panel A reports coefficient estimates and, in parentheses, standard errors clustered at the country in which the target has its primary listing. Panel B reports difference-in-differences estimates and, in parentheses, the significance (*p*-value) of these estimates based on Wald tests. US is an indicator for acquisitions of targets primarily listed in the United States. Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of stock market value distribution in the target's primary stock exchange in the sample period. Log of country stock index is the log of the normalized stock index of the target's country of primary listing at announcement. After is an indicator for acquisitions announced after July 31, 2002. Quarter fixed effects are based on the quarter and year in which the acquisition is announced. The regressions include unreported stock exchange fixed effects based on the stock exchange on which the target is primarily listed, and unreported industry fixed effects based on the single-digit SIC code of the target. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates

	(1)		(2)		(3)	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
US × After	–0.04	(0.05)	–0.09	(0.07)	–0.09	(0.07)
US × After × Small	0.21 ***	(0.01)	0.46 ***	(0.17)	0.50 **	(0.23)
US	–0.09	(0.09)	–0.03	(0.10)	–0.80 ***	(0.13)
Small	0.19 *	(0.10)	–0.19	(0.27)	2.25	(10.98)
US × Small	0.42 ***	(0.11)	0.30 **	(0.11)	0.36 **	(0.14)
Log of stock price index	–0.29	(0.26)	–0.31	(0.25)	–0.41	(0.30)
Quarter fixed effects	Included		Included		Included	
Quarter fixed effects × Small	–		Included		Included	
Quarter fixed effects × Log of stock price index	–		–		Included	
Industry fixed effects	Included		Included		Included	
Country fixed effects	Included		Included		Included	
Number of observations	3089		3089		3089	

Panel B: Difference-in-Differences Estimates

	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Acquisitions of small targets						
US × After + US × After × Small	0.17 ***	(0.00)	0.37 ***	(0.00)	0.41 **	(0.04)
Acquisitions of large targets						
US × After	–0.04	(0.44)	–0.09	(0.17)	–0.09	(0.19)

As noted earlier, we account for potential serial correlation by clustering standard errors at the target's primary stock exchange. In addition, we performed two checks to ensure that serial correlation is not a concern. First, we conducted the Arellano–Bond (1991) test and the Wooldridge (2002) test for serial correlation after converting the data into a true panel by

taking the means of the relevant variables for each primary stock exchange and quarter. Neither test showed serial correlation: The Arellano–Bond yielded a *p*-value of 0.98, and the Wooldridge test yielded a *p*-value of 0.48. Second, following Bertrand et al. (2004), we examined whether the results of Table 4 remain when we divide the sample into fewer periods.[10] Specifically, in unreported regressions, we repeated the analysis in Column (2) of Table 4 while dividing the sample into three periods (pre-SOX, first year after SOX, second year after SOX) and four periods (second year before SOX, first year before SOX, first year after SOX, second year after SOX). The results remained.[11]

To investigate whether SOX triggered an immediate exodus from the public capital market, we distinguish between acquisitions announced within the first year after the enactment of SOX and acquisitions announced thereafter. We do so by replacing the interaction of *US* with *After* in Equation (1) by an interaction of *US* with an indicator for acquisitions announced between August 1, 2002 and June 30, 2003 (*Period1*) and an interaction of *US* with an indicator for acquisitions announced between July 1, 2003 and December 31, 2004 (*Period2*).

Table 5 reports the results. The difference-in-differences estimate for acquisitions announced in the first year after the enactment of SOX is positive and significant, consistent

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[10] We thank an anonymous referee for suggesting this test.

[11] The coefficient estimate of the difference-in-differences for small targets were 0.29 and 0.29, and the *p*-value were 0.04 and 0.02, when dividing the sample into three periods and four periods, respectively. The coefficient estimate of the difference-in-differences for large targets was negative and insignificant in both regressions.

with the hypothesis that anticipated SOX compliance costs caused firms to exit the public capital market in that period. In contrast, there is no effect for acquisitions announced more than a year after the enactment of SOX.

Table 5: The Probability of Being Acquired by a Private Acquirer
SOX Effect Is Differentiated by Proximity to the Enactment of SOX

This table reports the results of estimating a probit model in which the dependent variable is being acquired by a private acquirer rather than by a public acquirer. Panel A reports coefficient estimates and, in parentheses, standard errors clustered at the country in which the target has its primary listing. Panel B reports difference-in-differences estimates and, in parentheses, the significance (*p*-value) of these estimates based on Wald tests. US is an indicator for acquisitions of targets primarily listed in the United States. Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of stock market value distribution in the target's primary stock exchange in the sample period. Log of country stock index is the log of the normalized stock index of the target's country of primary listing at announcement. Period1 is an indicator for acquisitions announced between August1, 2002 and June 30, 2003. Period2 is an indicator for acquisitions announced after June 30, 2003. Quarter fixed effects are based on the quarter and year in which the acquisition is announced. The regressions include unreported stock exchange fixed effects based on the stock exchange on which the target is primarily listed, and unreported industry fixed effects based on the single-digit SIC code of the target. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates		
	Coeff.	Std. Error
US × Period1	0.31 ***	(0.08)
US × Period2	–0.11	(0.08)
US	–0.70 ***	(0.11)
Log of stock price index	–0.28	(0.27)
Quarter fixed effects	Included	
Industry fixed effects	Included	
Country fixed effects	Included	
Number of observations	3089	

Panel B: Difference-in-Differences Estimates		
	Coeff.	p-value
Acquisitions announced in Period1		
US × Period1	0.31 ***	(0.00)
Acquisitions announced in Period2		
US × Period2	–0.11	(0.20)

Having found a post-SOX increase in going private by small targets (Table 4) and an increase in going private in the first year after the enactment of SOX (Table 5), we proceed to

test whether the effect on small targets is concentrated in the first year after the enactment of SOX. We do so by estimating the model reported in Table 5 for a sample of small target acquisitions.

Table 6 reports the results. Column (1) includes all of the small targets in our sample. The probability of acquisition by a private acquirer is significantly higher for acquisitions of American targets announced in the first year after the enactment of SOX. This effect is not only statistically significant, but also economically meaningful, raising the mean probability of going private by small targets predicted by the coefficients from 0.39 to 0.64.[12] In contrast, there is no effect for acquisitions announced more than a year after the enactment of SOX. In an unreported regression, we repeated this analysis for large firms, finding no similar effect (the coefficient estimate of the difference-in-differences in the first year after the enactment of SOX was 0.01 and the *p*-value was 0.92). This evidence is consistent with the hypothesis that SOX induced small firms, but not large firms, to go private within a year after its enactment.

To test whether the disappearance of the SOX effect is the result of a tightening of regulation outside the United States, Columns (2) and (3) exclude, respectively, targets primarily listed in Western Europe and Canada (which are more likely to have reformed their laws following SOX) and targets primarily listed in other foreign countries (which are less likely to have done so). The results in both columns are qualitatively similar to those in

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[12] The figures 0.39 and 0.64 are, respectively, the mean predicted probability that the American firms in our sample go private when both *Period1* and *Period2* are set to 0, and the mean predicted probability that the American firms in our sample go private when *Period1* is set to 1 and *Period2* is set to 0.

Column (1), though the statistical significance is lower in Column (3), perhaps due to the small number of foreign targets primarily listed outside Western Europe and Canada (93 targets, compared to 235 targets primarily listed in Western Europe or Canada). These findings suggest that the disappearance of the SOX effect is not due to a tightening of regulation outside the United States.

Table 6: Small Targets' Probability of Being Acquired by a Private Acquirer SOX Effect Is Differentiated by Proximity to the Enactment of SOX

This table reports the results of estimating a probit model in which the dependent variable is being acquired by a private acquirer rather than by a public acquirer. Targets are included if their CPI-adjusted stock market value four weeks before the acquisition is announced is less than the bottom quartile of stock market value in their primary stock exchange. Panel A reports coefficient estimates and, in parentheses, standard errors clustered at the country in which the target has its primary listing. Panel B reports difference-in-differences estimates and, in parentheses, the significance (*p*-value) of these estimates based on Wald tests. US is an indicator for acquisitions of targets primarily listed in the United States. Log of country stock index is the log of the normalized stock index of the target's country of primary listing at announcement. Period1 is an indicator for acquisitions announced between August1, 2002 and June 30, 2003. Period2 is an indicator for acquisitions announced after June 30, 2003. Quarter fixed effects are based on the quarter and year in which the acquisition is announced. The regressions include unreported stock exchange fixed effects based on the stock exchange on which the target is primarily listed, and unreported industry fixed effects based on the single-digit SIC code of the target. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates

	All Countries (1)		U.S. and Western Countries (2)		U.S. and Non-Western Countries (3)	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
US × Period1	0.72 ***	(0.21)	0.71 ***	(0.25)	0.62 *	(0.37)
US × Period2	0.13	(0.25)	0.05	(0.29)	–0.02	(0.38)
US	–0.72 **	(0.29)	–0.04	(0.30)	–0.77 **	(0.36)
Log of stock price index	–0.16	(0.71)	0.38	(0.79)	–0.67	(0.72)
Quarter fixed effects	Included		Included		Included	
Industry fixed effects	Included		Included		Included	
Country fixed effects	Included		Included		Included	
Number of observations	742		649		507	

Panel B: Difference-in-Differences Estimates

	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Acquisitions announced in Period1						
US × Period1	0.72 ***	(0.00)	0.71 ***	(0.00)	0.62 *	(0.09)
Acquisitions announced in Period2						
US × Period2	0.13	(0.62)	0.05	(0.87)	–0.02	(0.95)

4. Robustness Checks and Hypotheses Testing

We now turn to a number of robustness checks of our results.

A. Modifying the Control Group

Table 7 presents sensitivity analyses of the specification reported in Table 4. Column (1) reproduces Column (2) of Table 4. Column (2) reports the results of estimating the same regression model while excluding acquisitions by acquirers with more than one generation of parents. In our original sample, we define acquirers as private when both they and their ultimate parents are private. This definition, however, will cause us to label acquirers with private ultimate parents but public intermediate parents as private acquirers. SDC reports the Committee on Uniform Securities Identification Procedures (CUSIP) code of intermediate parents of acquirers, but does not report whether these parents are public. To ensure that we do not label acquirers with public intermediate parents as private acquirers, we exclude acquisitions in which the immediate parent and the ultimate parent of the acquirer have different CUSIP codes.

To control for cross-country variation in market conditions not captured by the stock index, Column (3) reports the results of estimating the same regression model for targets traded in United States, Canada, or Western Europe. Similarly, Column (4) presents results for targets traded in the United States or Canada. Over the sample period, the correlation between the stock index in the United States and the mean stock index in the Western European countries in our sample is 0.97, and the corresponding correlation between the stock indexes in the United States and Canada is 0.90. In contrast, the corresponding correlation

between the stock index in the United States and the mean stock index in the remaining countries in our original sample is 0.56.

Table 7: Sensitivity Analysis of the Foreign Target Definition

This table reports difference-in-differences estimates obtained from fitting a probit model in which the dependent variable is being acquired by a private acquirer rather than by a public acquirer. Standard errors are clustered at the country in which the target has its primary listing. The significance (*p*-value) of these estimates based on Wald tests is provided in parentheses. Column (1) reproduces Column (2) of Table 4. Columns (2) to (4) report the results of estimating the same specification for different samples. US is an indicator for acquisitions of targets primarily listed in the United States. Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of stock market value distribution in the target's primary stock exchange in the sample period. After is an indicator for acquisitions announced after July 31, 2002. Quarter fixed effects are based on the quarter and year in which the acquisition is announced. Significance (*p*-value): * 10%, ** 5%, *** 1%.

	Column (2) of Table 4 (1)	Acquirers With Multiple Parents Excluded (2)	U.S. and Western Countries (3)	U.S. and Canada (4)
Acquisitions of small targets				
US × After + US × After × Small	0.37***	0.40***	0.42**	0.88***
	(0.00)	(0.00)	(0.01)	(0.00)
Acquisitions of large targets				
US × After	–0.09	–0.07	–0.11	–0.38***
	(0.17)	(0.32)	(0.18)	(0.00)
Number of observations	3089	2920	2577	1759

As Table 7 suggests, our results are robust. Indeed, the difference-in-differences estimate for acquisitions of small targets retains not only its sign and significance, but also its magnitude, in most specifications. Moreover, in some specifications the magnitude of our estimates increases. This is the case, for example, in Columns (3) and (4), which report stronger results for acquisitions in the most comparable markets to the American market

(Canada and Western Europe), even though the samples in these columns are smaller than our original sample.

B. Modifying the Definition of a Small Firm

Next, we conduct robustness checks of our definition of a small firm. Table 8 reports our results. Column (1) of Table 8 reproduces Column (2) of Table 4, which classifies a target as small if its CPI-adjusted stock market value four weeks before the acquisition is announced was in the bottom quartile of its primary stock exchange regardless of when the target was acquired. However, if target stock prices declined during the sample period, using a fixed value cutoff would result in an increase in the number of firms classified as small after the enactment of SOX. To address this concern, we calculate the bottom quartile of the CPI-adjusted stock market value for pre-SOX and post-SOX acquisitions separately, and classify a target as small based on the bottom quartile of its primary stock exchange in the period its acquisition was announced. Column (2) reports the results of using this classification. Column (3) reports the results of using the bottom quartile of the entire sample ($16 million) as a value cutoff for all targets. Column (4) reports the results of classifying a target as small if it was in the bottom quartile of the entire sample in the period its acquisition was announced ($20 million before SOX, and $13 million after SOX). The estimates in Columns (1) through (4) are qualitatively similar.

Table 8: Sensitivity Analysis of the Small Target Definition

This table reports difference-in-differences estimates obtained from fitting a probit model in which the dependent variable is being acquired by a private acquirer rather than by a public acquirer. Standard errors are clustered at the country in which the target has its primary listing. The significance (*p*-value) of these estimates based on Wald tests is provided in parentheses. Column (1) reproduces Column (2) of Table 4. In Column (2), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of the stock market value distribution in the target's primary stock exchange in the period in which the acquisition is announced (pre-SOX or post-SOX). In Column (3), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is less than $16 million, corresponding to the bottom quartile of stock market value distribution of the sample. In Column (4), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is less than $20 million for acquisition announced before the enactment of SOX, and $13 million for acquisitions announced after the enactment of SOX, corresponding to the bottom quartile of stock market value distribution of the sample in each period. US is an indicator for acquisitions of targets primarily listed in the United States. After is an indicator for acquisitions announced after July 31, 2002. Quarter fixed effects are based on the quarter and year in which the acquisition is announced. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Definition of Small	Market Value in Bottom Quartile by Country (1)	Market Value in Bottom Quartile by Country, Defined Pre/Post-SOX Separately (2)	Market Value in Bottom Quartile (<$16 Million) (3)	Market Value in Bottom Quartile, Defined Pre/Post-SOX Separately (<$20/$13 Million) (4)
Acquisitions of small targets				
US × After + US × After × Small	0.37***	0.50***	0.30**	0.45***
	(0.00)	(0.00)	(0.02)	(0.00)
Acquisitions of large targets				
US × After	–0.09	–0.07	–0.08	–0.06
	(0.17)	(0.30)	(0.19)	(0.34)
Number of observations	3089	3089	3089	3089

C. Controlling for the Availability of Private Equity

As a final robustness check, we investigate whether our results are driven by an increase in the availability of private equity capital in the United States relative to other countries after the enactment of SOX. We do so by examining whether post-SOX private acquirers in the United States gravitate towards public targets and away from private targets. Even if post-SOX private equity capital became more available in the United States, the additional funds could be invested in public targets and private targets in the same proportions as pre-SOX. An increase in the ratio of public target acquisitions would imply an increase in the appeal of going-private transactions as an investment outlet in the United States.

Accordingly, we estimate for a sample of domestic acquisitions by private acquirers a variation of the regression model reported in Table 4 in which the dependent variable is an indicator for acquisitions of public targets, rather than private ones. We determine a public target's nation by its stock exchange, and a private target's by its headquarters. Based on our earlier finding that the SOX effect was strongest in the first year following the enactment of SOX, we include only acquisitions announced in that period.

Table 9 reports the results. Column (1) presents the results we obtain when defining a target as small if its CPI-adjusted stock market value four weeks before the acquisition is announced was less than the bottom quartile of the market distribution in its primary stock exchange. Column (2) presents the results we obtain when we use the pre-SOX bottom quartile of the target's primary stock exchange as a value cutoff for acquisitions announced

before the enactment of SOX, and the post-SOX bottom quartile for acquisitions announced thereafter. In both columns, the difference-in-differences estimates for acquisitions of small targets are positive. In contrast, the difference-in-differences estimate is insignificant for acquisitions of large targets. This suggests that the availability of private equity is not the only driving force behind our earlier finding that small public targets gravitate towards private acquirers after the enactment of SOX. In terms of economic significance, the coefficients reported in Column (2) predict a significant increase from 0.24 to 0.33 in the probability of purchasing a small public target rather than a small private target after the enactment of SOX.

In an unreported regression, we use a sample of small target acquisitions by private acquirers to examine the longevity of the increase in the probability that private acquirers will buy public targets. We find that this effect, like the increase in the probability that public targets will be sold to private acquirers, disappears in the second year after the enactment of SOX, suggesting that the two effects are related.

Table 9: Private Acquirers' Probability of Acquiring a Public Target for Acquisitions Announced Through June 30, 2003

This table reports the results of estimating a probit model in which the dependent variable is acquiring a public target rather than a private target. All of the acquirers are private. Panel A reports coefficient estimates and, in parentheses, standard errors clustered at the country in which the target has its primary listing. Public targets' nation is determined by stock exchange, and private targets' nation is determined by headquarters. Cross-border acquisitions are excluded. Panel B reports difference-in-differences estimates and, in parentheses, the significance (*p*-value) of these estimates based on Wald tests. US is an indicator for acquisitions of public targets primarily listed in the United States or private targets headquartered in the United States. After is an indicator for acquisitions announced after July 31, 2002. In Column (1), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of stock market value distribution in the target's primary stock exchange in the sample period. In Column (2), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of the stock market value distribution in the target's primary stock exchange in the period in which the acquisition is announced (pre-SOX or post-SOX). Unreported regressors include quarter, industry and country fixed effects, and interaction of quarter fixed effects with Small. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates				
Definition of Small	Market Value in Bottom Quartile by Country (1)		Market Value in Bottom Quartile by Country, Defined Pre/Post-SOX Separately (2)	
	Coeff.	Std. Error	Coeff.	Std. Error
US × After	0.11	(0.13)	0.16	(0.12)
US × After × Small	0.21	(0.21)	0.12	(0.18)
US	–0.92 ***	(0.08)	–0.47 ***	(0.07)
Small	–0.55 ***	(0.13)	–0.95 ***	(0.24)
US × Small	0.26 **	(0.11)	0.25 ***	(0.10)
Number of observations	3012		3012	

Panel B: Difference-in-Differences Estimates				
	Coeff.	p-value	Coeff.	p-value
Acquisitions of small targets				
US × After + US × After × Small	0.32 **	(0.04)	0.28 **	(0.05)
Acquisitions of large targets				
US × After	0.11	(0.38)	0.16	(0.19)

D. New Sales Hypothesis versus All Sales Hypothesis

Finally, we use two indirect tests to examine which of our hypotheses — the "new sales hypothesis", or the "all sales hypothesis" — is generating our results.

First, the "new sales hypothesis" predicts that, SOX would increase the number of public firms for sale and, given a sufficiently dense population of private acquirers, these firms would in turn attract financial acquirers looking for a bargain, rather than a strategic match. We test this prediction by estimating the regression model reported in Table 4 separately for financial acquirers and strategic acquirers. We classify an acquirer as a financial acquirer if its industry is investment-related while the target's industry is not. This classification ensures that acquisitions by financial firms for strategic reasons are not mistakenly classified as acquisitions for financial reasons.

Table 10 presents the results. Column (1) reproduces Column (2) of Table 4. In Column (2), which excludes financial acquirers, the small target effect disappears. In contrast, in Column (3), which excludes strategic acquirers, the small target effect becomes stronger.[1] These findings suggest that the "new sales hypothesis" is the driving force behind our results.

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[1] In the sample, 34% of 439 American private acquirers, and 35% of 566 foreign private acquirers, are strategic acquirers.

Table 10: Probability of Being Acquired by a Private Acquirer

This table reports difference-in-differences estimates obtained from fitting a probit model in which the dependent variable is being acquired by a private acquirer rather than by a public acquirer. Standard errors are clustered at the country in which the target has its primary listing. The significance (*p*-value) of these estimates based on Wald tests is provided in parentheses. Column (1) reproduces Column (2) of Table 4. Column (2) reports the results of estimating the same specification excluding financial buyers. Column (3) reports the results of estimating the same specification excluding strategic buyers. US is an indicator for acquisitions of targets primarily listed in the United States. Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of stock market value distribution in the target's primary stock exchange in the sample period. After is an indicator for acquisitions announced after July 31, 2002. Quarter fixed effects are based on the quarter and year in which the acquisition is announced. Significance (*p*-value): * 10%, ** 5%, *** 1%.

	Column (2) of Table 4 (1)	Strategic Acquirers (2)	Financial Acquirers (3)
Acquisitions of small targets			
US × After + US × After × Small	0.37***	0.13	2.20***
	(0.00)	(0.49)	(0.00)
Acquisitions of large targets			
US × After	–0.09	–0.04	–0.09
	(0.17)	(0.66)	(0.50)
Number of observations	3089	2295	736

Second, we test the "all sales hypothesis" separately. This hypothesis predicts that post-SOX public acquirers will shy away from acquiring any target that would add to their SOX costs. This includes not only public targets, which in the period we study were not yet required to comply, but also private targets, which were never required to comply.[2] In

[2] In June 2003, the SEC issued rules on the duty to evaluate annually the effectiveness of internal controls over financial reporting. These rules required firms with a minimum float of $75 million and at least one year of financial reporting to comply in their annual reports for fiscal years ending after June 14, 2004, and

contrast, the "new sales hypothesis" predicts that SOX will affect the acquisition market only by pushing public targets to go private, and will have no effect on private target acquisitions. In other words, while the "new sales hypothesis" predicts an increase in the number of public targets selling, with the new sales attracting private acquirers, the "all sales hypothesis" predicts a decrease in the number of public acquirers buying any target.

We test this prediction by estimating the regression model reported in Table 4 for a sample of acquisitions of private targets. Because our focus is the acquirer's decision, we determine whether the acquisition creates SOX obligations based on the acquirer's nation, rather than the target's. We determine public acquirers' nation by their primary stock exchange, and private acquirers' nation by their headquarters.

Table 11 reports the results. Columns (1) and (2) differ only in the definition of a small target. There is no evidence that a private target's probability of acquisition by a public acquirer rather than a private one decreases after the enactment of SOX. These findings, like the ones in Table 10, suggest that the "new sales hypothesis" is the driving force behind our results.

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required other firms to comply for fiscal years ending after April 14, 2005. Both deadlines were subsequently postponed.

Table 11: Private Targets' Probability of Being Acquired by a Public Acquirer for Acquisitions Announced through June 30, 2003

This table reports the results of estimating a probit model on a sample of private targets in which the dependent variable is being acquired by a public acquirer rather than by a private acquirer. Panel A reports coefficient estimates and, in parentheses, standard errors clustered at the country level. Public acquirers' nation is determined by stock exchange, and private acquirers' nation is determined by headquarters. Panel B reports difference-in-differences estimates and, in parentheses, the significance (*p*-value) of these estimates based on Wald tests. US is an indicator for acquisitions by public acquirers primarily listed in the United States or private acquirers headquartered in the United States. After is an indicator for acquisitions announced after July 31, 2002. In Column (1), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is less than $15 million. In Column (1), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of stock market value distribution in the target's primary stock exchange in the sample period. In Column (2), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is in the bottom quartile of the stock market value distribution in the target's primary stock exchange in the period in which the acquisition is announced (pre-SOX or post-SOX). Unreported regressors include quarter, industry, and country fixed effects, and interaction of quarter fixed effects with Small. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates				
Definition of Small	Market Value in Bottom Quartile by Country (1)		Market Value in Bottom Quartile by Country, Defined Pre/Post-SOX Separately (2)	
	Coeff.	Std. Error	Coeff.	Std. Error
US × After	0.14	(0.19)	0.17	(0.13)
US × After × Small	–0.13	(0.15)	–0.18	(0.11)
US	0.05	(0.47)	0.06	(0.46)
Small	–0.12	(0.14)	0.11	(0.12)
US × Small	–0.13	(0.15)	–0.13	(0.09)
Number of observations	9680		9680	
Panel B: Difference-in-Differences Estimates				
	Coeff.	p-value	Coeff.	p-value
Small targets				
US × After + US × After × Small	0.01	(0.93)	–0.01	(0.97)
Large targets				
US × After	0.14	(0.46)	0.17	(0.20)

5. Conclusion

In this article, we reported evidence consistent with the hypothesis that the Sarbanes-Oxley Act of 2002 disproportionately burdens small firms. In particular, using acquisitions of

foreign targets as a control group, we have found that the propensity of small public American targets to be acquired by private acquirers rather than public ones increased substantially in the first year after enactment of SOX. In contrast, we did not found a similar effect for large targets. These results were robust in a number of alternative specifications.

We offered two interpretations of these findings. According to the "new sales hypothesis," the enactment of SOX induced small firms to be sold. The acquirers of these firms, in turn, tended to be financial acquirers for reasons unrelated to SOX. According to the "all sales hypothesis," SOX reduced the price that public acquirers would be willing to pay in an acquisition because they inherit any firm-specific compliance costs associated with the target. These compliance costs are relatively higher for smaller targets. We found more evidence in favor of the "new sales hypothesis".

To be sure, our findings do not answer all of the questions that need to be answered for evaluating SOX. First, the exodus of small firms from the public capital market would be a blessing if the departing firms were prone to the type of financial fraud that SOX seeks to limit. Second, even if SOX burdened small firms with no connection to the integrity of their financial statements, it could benefit firms that remained public enough to justify this cost. Finally, the experience that market participants have continued to develop in complying with SOX and the steps that regulators have taken to clarify its requirements may have lowered the costs below their level in the period we study. This article sheds light on an important piece of this puzzle.

References

Aquila, Frank, and Jeff Golden. 2002. "M&A Due Diligence in the Wake of Recent Events," *M&A Lawyer*, September, 1–7.

Arellano, Manuel, and Stephen Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," 58 *Review of Economic Studies* 277–297.

Athey Susan, and Scott Stern. 2002. "The Impact of Information Technology on Emergency Health Care Reforms," 33 *RAND Journal of Economics* 399–432.

Baker, George P., and Karen H. Wruck. 1990. "Organizational Changes and Value Creation in Leveraged Buyouts: The Case of O.M. Scott & Sons Company," 25 *Journal of Financial Economics* 163–190.

Benninga, Simon, Mark Helmantel, and Oded Sarig. 2005. "The Timing of Initial Public Offerings," 75 *Journal of Financial Economics* 115–132.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. "How Much Should We Trust Differences-in-Differences Estimates?," 119 *Quarterly Journal of Economics* 249–275.

Bertrand, Marianne, and Sendhil Mullainathan. 1999. "Is There Discretion in Wage Setting? A Test Using Takeover Legislation," 30 *RAND Journal of Economics* 535–554.

Block, Stanley B. 2004. "The Latest Movement to Going Private: An Empirical Study," 14 *Journal of Applied Finance* 36–44.

Carney, William J. 2006. "The Costs of Being Public After Sarbanes-Oxley: The Irony of

"Going Private"," 55 *Emory Law Journal* 141–160.

Chhaochharia, Vidhi, and Yaniv Grinstein. 2007. "Corporate Governance and Firm Value: The Impact of the 2002 Governance Rules," 62 *Journal of Finance* 1789–1825.

Coates, John C. IV. 2007. "The Goals and Promise of the Sarbanes-Oxley Act," 21 *Journal of Economic Perspectives* 91–116.

Cohen, Daniel A., Aiyesha Dey, and Thomas Z. Lys. 2007. "The Sarbanes-Oxley Act of 2002: Implications for Compensation Structure and Risk-Taking Incentives of CEOs," Working paper, New York University.

Cohen, Daniel A., Aiyesha Dey, and Thomas Z. Lys. 2008. "Real and Accrual-Based Earnings Management in the Pre- and Post-Sarbanes Oxley Periods," *Accounting Review*, forthcoming.

Cunningham, Lawrence A. 2003. "The Sarbanes-Oxley Yawn: Heavy Rhetoric, Light Reform (and It Just Might Work)," 35 *Connecticut Law Review*, 915–988.

Donohue, John J., III, James J. Heckman, and Petra E. Dodd. 2002. "The Schooling of Southern Blacks: The Roles of Legal Activism and Private Philanthropy, 1910–1960," 117 *Quarterly Journal of Economics* 225–268.

Doyle, Jeffrey T., Weili Ge, and Sarah E. McVay., 2007. "Determinants of Weaknesses in Internal Control Over Financial Reporting," 44 *Journal of Accounting and Economics* 193–223.

The Economist Magazine. 2003. "A (Going) Private Matter," March 22.

Eldridge, Susan W., and Burch T. Kealey. 2005. "Descriptive Evidence on SOX Audit Costs," 5 *Journal of Accounting, Ethics & Public Policy* 343–373.

Engel, Ellen, Rachel M. Hayes, and Xue Wang. 2007. "The Sarbanes-Oxley Act and Firms' Going-Private Decisions," 44 *Journal of Accounting and Economics* 116–145.

Financial Services Authority. The Combined Code on Corporate Governance, July 2003.

Glover, Stephen I., and Lindsay B. Krause. 2004. "The Impact of Sarbanes-Oxley's Internal Control Rules on M&A Transactions," *M&A Lawyer*, February, 1–8.

Gordon, Jeffrey N. 2003. "Governance Failures of the Enron Board and the New Information Order of Sarbanes-Oxley," 35 *Connecticut Law Review* 1125–1143.

Gruber, Jonathan. 2000. "Disability Insurance Benefits and Labor Supply," 108 *Journal of Political Economy* 1162–1183.

Holmstrom, Bengt, and Steven N. Kaplan. 2003. "The State of U.S. Corporate Governance: What's Right and What's Wrong?," 15 *Journal of Applied Corporate Finance* 8–20.

Holstein, William J. 2004. "The Very Big Business of Private Equity," *New York Times*, May 23, Section 3, 11.

Jain, Pankaj K., Jang-Chul Kim, and Zabihollah Rezaee. 2008. "The Sarbanes-Oxley Act of 2002 and Market Liquidity," *Financial Review*, forthcoming.

Jain, Pankaj K., and Zabihollah Rezaee. 2006. "The Sarbanes-Oxley Act of 2002 and Capital-Market Behavior: Early Evidence," 23 *Contemporary Accounting Research* 629–654.

Jensen, Michael C. 1989. "Eclipse of the Public Corporation," *Harvard Business Review* September–October, 61–74.

Kamar, Ehud, Pinar Karaca-Mandic, and Eric Talley. 2007. Sarbanes-Oxley and Small Firms: What Is the Evidence?, in S.M. Gates & K. Leuschner, eds., *In the Name of Entrepreneurship? The Logic and Effects of Special Regulatory Treatment for*

Small Business. Santa Monica, CA: RAND.

Kaplan, Steven. 1989a. "The Effects of Management Buyouts on Operating Performance and Value," 24 *Journal of Financial Economics* 217–254.

———. 1989b. "Management Buyouts: Evidence on Taxes as a Source of Value," 44 *Journal of Finance* 611–632.

Klingsberg, Ethan, and Marie Noble. 2004. "SOX 404-Mania: Y2K Déjà Vu, Myths, Risks and What It All Means for M&A," *M&A Lawyer*, September, 1–7.

Leuz, Christian, Alexander J. Triantis, and Tracy Yue Wang. 2008. "Why Do Firms Go Dark? Causes and Economic Consequences of Voluntary SEC Deregistrations," *Journal of Accounting and Economics*, forthcoming.

Li, Haidan, Morton Pincus, and Sonja O. Rego. 2008. "Market Reaction to Events Surrounding the Sarbanes-Oxley Act of 2002 and Earnings Management," *Journal of Law and Economics*, forthcoming.

Lichtenberg, Frank R., and Donald Siegel. 1990. "The Effect of Leveraged Buyouts on Productivity and Related Aspects of Firm Behavior," 27 *Journal of Financial Economics* 165–194.

Litvak, Kate. 2007a. "The Effect of the Sarbanes-Oxley Act on Non-US Companies Cross-Listed in the US," 13 *Journal of Corporate Finance* 195–228.

Litvak, Kate. 2007b. "Sarbanes-Oxley and the Cross-Listing Premium," 105 *Michigan Law Review* 1857–1898.

MacFadyen, Ken. 2002. "Long Awaited Deal Flood Hits in Q3," *Buyouts*, October 7, 1.

———. 2003. "Deal Flow Surges Forward with Q4 Splash: Fourth Quarter Deals Push

Year-End Volume to $42 billion," *Buyouts*, January 6, 1

———. 2004. "The Deals Just Keep Coming and Coming," *Buyouts*, July 12, 1.

Maupin, Rebekah J., Clinton M. Bidwell, and Alan K. Ortegren. 1984. "An Empirical Investigation of Publicly-Quoted Corporations which Change to Closely-Held Ownership through Management Buyouts," 11 *Journal of Business Finance & Accounting* 435–450.

Pagano, Marco, Fabio Panetta, and Luigi Zingales. 1998. Why Do Companies Go Public? An Empirical Analysis," 53 *Journal of Finance* 27–64.

Pagano, Marco, and Ailsa Röell. 1998. "The Choice of Stock ownership Structures: Agency Costs, Monitoring, and the Decision to Go Public," 113 *Quarterly Journal of Economics* 187–225.

Ribstein, Larry E. 2002. "Market vs. Regulatory Responses to Corporate Fraud: A critique of the Sarbanes-Oxley Act of 2002," 28 *Journal of Corporation Law* 1–67.

Romano, Roberta. 2005. "The Sarbanes–Oxley Act and the Making of Quack Corporate Governance," 114 *Yale Law Journal* 1521–1611.

Advisory Committee on Smaller Public Companies. 2006. "Final Report to the United States Securities and Exchange Commission," http://www.sec.gov/info/smallbus/acspc/acspc-finalreport.pdf.

Smith, Abbie J. 1990. "Corporate Ownership Structure and Performance: The Case of Management Buyouts," 27 *Journal of Financial Economics* 143–164.

Solomon, Deborah. 2005. "Small Firms to Get another Extension on Sarbanes Rule," *Wall Street Journal*, September 13, A2.

Wall Street Journal. 2005. "SOX and Stocks," April 19, A20.

Walton, Leigh, and Joel I. Greenberg. 2003. "The Impact of Sarbanes–Oxley on Merger & Acquisition Practices," *M&A Lawyer*, June, 6–15.

Wintoki, M. Babajide. 2007. "Corporate Boards and Regulation: The Effect of the Sarbanes–Oxley Act and the Exchange Listing Requirements on Firm Value," 13 *Journal of Corporate Finance* 229–250.

Whoriskey, Neil. 2005. "Taking Foreign Issuers Private," *M&A Lawyer*, May, 13–19.

Wooldridge, Jeffrey M. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.

Zhang, Ivy Xiying. 2007. "Economic Consequences of the Sarbanes–Oxley Act of 2002," 44 *Journal of Accounting and Economics* 74–115.

Appendix

Below we model the effect of regulatory shocks like the Sarbanes-Oxley Act of 2002 (SOX) on the probability that public firms will be sold and the probability that acquirers of public firms will be private. In our model, the enactment of SOX can increase or decrease each of three components of the net cost of being public: a net fixed regulatory cost that any firm faces notwithstanding its specific attributes, a net fixed regulatory cost that is specific to the attributes of the firm, and a net variable cost that varies by firm size. We generate three hypotheses:

More Sales Hypothesis: If SOX was associated with an increase in the net fixed cost, the net firm-specific cost, or net the variable cost (or decreased the net fixed cost, the net firm-specific benefit, or the net variable benefit) of being public, more public firms would be sold than in the absence of SOX.

All Sales Hypothesis: If SOX was associated with an increase in the net firm-specific cost or the net variable cost (or decreased the net firm-specific benefit or the net variable benefit) of being public, public firms pursuing a sale would be more likely to be acquired by private acquirers.

New Sales Hypothesis: Any new sales triggered by SOX (through either the More Sales or All Sales hypotheses) are more likely to involve financial acquirers, which are usually private, than other acquirers.

We further show that, if the net variable cost of being public is decreasing in

firm size (or, equivalently, the net benefits are increasing in firm size), the changes predicted by each of these hypotheses will be more pronounced for small firms than for large firms.

A. Framework

Consider a public firm. If the firm remains public after the enactment of SOX, it will generate cash flows with a net present value of x_0. We assume that x_0 is drawn from a population with a distribution $\Phi(x_0)$ and that its realization is common knowledge. In addition, the incumbent management adds an intrinsic value ε_0 to the value of the firm. We assume that both x_0 and ε_0 are common knowledge.[3]

Upon observing x_0 and ε_0, the firm's management decides whether to pursue a sale. Potential acquirers come from two populations: private firms (such as private equity funds or private operating companies), of which there are $N \geq 2$ firms indexed $i = 1, \ldots, N$; and public firms, of which there are $M \geq 2$ firms indexed $i = N + 1, \ldots, N + M$. All acquirers observe the realization of x_0 under the firm's current ownership and each acquirer observes its own valuation of the firm. In particular, private acquirers draw valuations ε_i, which are independently and identically distributed on $[-\bar{\varepsilon}, \bar{\varepsilon}]$ according to a positive probability density function $f(\varepsilon)$ and an associated cumulative density function $F(\varepsilon)$. Similarly, public

[3] The assumption that ε_0 is common knowledge can be relaxed without altering our results if ε_0 is uncorrelated with acquirer valuations.

acquirers draw valuations ε_i, which are independently and identically distributed on $[-\bar{\varepsilon}, \bar{\varepsilon}]$ according to a positive probability density function $g(\varepsilon)$ and an associated cumulative density function $G(\varepsilon)$. Although the two distributions need not be identical, we assume that both F and G exhibit monotone hazard rates, so that $\frac{f(\varepsilon)}{F(\varepsilon)}$ and $\frac{g(\varepsilon)}{G(\varepsilon)}$ are nonincreasing for all ε.

Public acquirers derive benefits from being public but also bear costs of complying with SOX regardless of whether they make an acquisition.[4] Specifically, we assume that the net costs for firm i of being public are $c_F + c_Q + c_V \cdot \psi(x_0)$. Because access to public capital markets involves both costs and benefits, each of the above components of net costs can be positive or negative.

The first term, c_F, is a net fixed cost that any firm faces from being public notwithstanding its specific attributes, and can therefore be amortized across a firm regardless of its size or its acquisition actions. The second term, c_Q, is a net fixed cost that is specific to the attributes of the firm, such as its business and its culture, and would therefore be assumed by an acquirer even if the acquirer were already complying with SOX. Finally, $c_V \cdot \psi(x_0)$ is a

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[4] Each acquirer can also have a value associated with its own existing operations given by x_i (i =1,2,…,N+M) and drawn, for simplicity, from a series of independently and identically distributed random variables X_i with a probability density function $\phi(X_i)$. We omit this detail from the model because it does not affect the results.

net cost that varies by firm size and is scaled by the parameter $c_V \geq 0$. A positive shock to c_V will increase this net cost for firms with $\psi(x_0) > 0$ and decrease it for firms with $\psi(x_0) < 0$. Because larger firms attract more attention in the public capital market, they reap higher benefits from being public. They also enjoy scale economies in compliance. We therefore conjecture that $\psi'(x_0) < 0$ in the relevant range. This conjecture is not needed for the model; however, as we explain in Section V below, it can yield a prediction that small firms and large firms will react differently to SOX.[5]

The firm's management chooses whether to pursue a sale. Pursuing a sale requires a fixed cost k, which is commonly known at the time of this decision but is distributed ex ante on $[0,\infty)$ according to a probability density function $\omega(k)$ and an associated cumulative density function $\Omega(k)$. Should management opt to sell, it will conduct a second-price auction and select a single reservation price s below which it will not sell.[6]

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[5] For simplicity, we assume that a firm's variable net cost is additively separable from that of any firm that might acquire it. Thus, if acquirer j of size x_j acquires firm i of size x_i, the post-acquisition variable cost of the combined entity equals $c_v(\psi(x_j) + \psi(x_i))$. Relaxing this assumption is possible, but would

[6] Vickrey, William W. 1962. Auction and bidding games, in *Recent Advances in Game Theory.* Princeton, NJ; Princeton University Conference. This assumption is tantamount to allowing the firm to bid for itself with a publicly revealed bid. A uniform reservation price is suboptimal when acquirers are heterogeneous, but state law requires firms to treat acquirers evenhandedly. *See Revlon, Inc. v. McAndrews & Forbes Holdings,*

B. Payoffs

We begin by presenting the payoffs of the players. Consider first the firm's management, which for simplicity is assumed to be identified with shareholders. Once management observes x_0 and ε_0, it updates its expected valuation of the firm. If it decides to keep the firm independent, it will realize a payoff v_{NA} given by

$$v_{NA} = x_0 + \varepsilon_0 - \left(c_F + c_Q + c_V \cdot \psi\left(x_0\right)\right).$$

If management chooses to pursue a sale, it will cause the firm to expend k and will have a reservation value (i.e., if it fails to obtain its reservation price) of:

$$\begin{aligned} v_A &= v_{NA} - k \\ &= x_0 - k + \varepsilon_0 - \left(c_F + c_Q + c_V \cdot \psi\left(x_0\right)\right). \end{aligned}$$

Note that in either case, the firm management's reservation value decreases in the net cost of being public. Management will pursue a sale only if it expects a price v_A sufficiently high to compensate for the sale cost k. Such an assessment depends on the equilibrium of the

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Inc., 506 A.2d 173 (Del. 1986); *Paramount Communications, Inc. v. QVC Network, Inc.*, 637 A.2d 34 (Del. 1994).

game.

Now consider the population of acquirers in the event that management puts the firm up for sale. Private acquirer *i*'s valuation of the firm (which, in a second-price auction, is also its optimal bid) is

$$V_i^{priv} = x_0 - k + \varepsilon_i,$$

for $i \in \{1,...,N\}$. None of the costs and benefits of being public enter in here because the acquirer is private.[7] The premium τ_i^{priv} that a private acquirer i will be willing to pay over the firm management's reservation value is

$$\begin{aligned}\tau_i^{priv} &= V_i^{priv} - v_A \\ &= \varepsilon_i - \varepsilon_0 + c_F + c_Q + c_V \cdot \psi(x_0).\end{aligned}$$

Note that the premium that private acquirers are willing to pay above management's

[7] Financial acquirers, which are private acquirers that buy firms for investment purposes, anticipate that they will bear the cost of being public a few years after the acquisition, when they sell the firm to a public acquirer or take it public. We ignore this future cost for simplicity and note that the time value of money and the expectation that compliance will become cheaper over time make this cost lower than the immediate cost that a public acquirer faces.

reservation value increases in the net cost of being public, consistent with the decrease of management's reservation price in the net cost of being public.

Similarly, each public acquirer i's valuation of the firm (which is also its optimal bid) is:

$$V_i^{pub} = x_0 - k + \varepsilon_i - c_Q - c_V \cdot \psi(x_0).$$

Unlike private acquirers, public acquirers consider the post-acquisition net cost of being public when they bid. However, the ordinary fixed-cost component, c_F, does not affect the bid because the acquirer has already expended it. The premium τ_i^{pub} that a public acquirer i will be willing to pay over the firm management's reservation value is

$$\begin{aligned} \tau_i^{pub} &= V_i^{pub} - v_A \\ &= \varepsilon_i - \varepsilon_0 + c_F . \end{aligned}$$

Note that for public acquirers, the premium above management's reservation value increases only in the fixed cost component, since public acquirers have no comparative advantage of ownership over incumbent owners for firm-specific or variable costs.

C. Equilibrium Sales

To solve this game, we use backwards induction with Perfect Bayesian equilibrium, starting from the auction stage and proceeding to the firm management's decision whether to pursue a sale.

Because the sale is a second-price auction, all acquirers reveal their true valuations and this revelation determines whether they win the auction, but not how much they pay. In contrast, as the section below will demonstrate, the firm's management will select a reservation price *s** above its reservation value v_A.

Let $\tau^{(k)}$ denote the k-th order statistic of the set of the premia offered in the auction — that is, the *k*-th highest bid premium over v_A (either public or private), where $k \in \{1,2,...N+M\}$. Similarly, let $h^{(k)}(.)$ and $H^{(k)}(.)$ denote, respectively, the probability density function and the cumulative density function of $\tau^{(k)}$. Once the firm's management decides to pursue a sale, it sets a reservation price to maximize — given the bidding strategies of the acquirers — its expected gains from the auction. Analysis of this problem yields the following result:

Lemma 1: *In the event of an auction, the firm's management will optimally set a reservation price* $s^* = v_A + \frac{H^{(2)}(s)-H^{(1)}(s)}{h^{(1)}(s)}$, *which strictly exceeds* v_A.

Proof: It is convenient to redefine the reservation price in terms of a reservation premium σ, where $\sigma = s - v_A$. In the event of a sale, the premium will equal to the maximum of

$$\pi(\sigma) = \begin{cases} \tau^{(2)} & \text{if } \sigma < \tau^{(2)} \\ \sigma & \text{if } \sigma \in \left[\tau^{(2)}, \tau^{(1)}\right] \\ 0 & \text{if } \sigma > \tau^{(1)} \end{cases}.$$

Consequently, the firm shareholders' expected profit is equal to

$$\begin{aligned} E(\pi(\sigma)) &= \Pr\left\{\sigma \in \left[\tau^{(2)}, \tau^{(1)}\right]\right\} \cdot \sigma + \Pr\left\{\sigma < \tau^{(2)}\right\} \cdot E\left\{\tau^{(2)} \mid \sigma < \tau^{(2)}\right\} \\ &= \left(H^{(2)}(\sigma) - H^{(1)}(\sigma)\right) \cdot \sigma + \int_{\sigma}^{\bar{\tau}} \tau \cdot h^{(2)}(\tau) d\tau \\ &= \bar{\tau} - H^{(1)}(\sigma) \cdot \sigma - \int_{\sigma}^{\bar{\tau}} H^{(2)}(\tau) d\tau. \end{aligned}$$

Differentiating with respect to σ yields

$$\begin{aligned} &\frac{dE(\pi)}{d\sigma} = -H^{(1)}(\sigma) - h^{(1)}(\sigma) \cdot \sigma + H^{(2)}(\sigma) = 0 \\ &\quad \Leftrightarrow \\ &\sigma^* = \frac{H^{(2)}(\sigma) - H^{(1)}(\sigma)}{h^{(1)}(\sigma)} > 0. \end{aligned}$$

Monotone hazard rates of the individual distributions on τ ensure that this condition is both necessary and sufficient for an optimum. Consequently, the optimal reservation price for the auction is given by $s^* = \sigma^* + v_A$.

The intuition behind Lemma 1 is similar to the intuition behind conventional monopoly pricing problems. While setting the reservation price above v_A reduces the

probability of a sale if the highest valuing acquirer values the firm below this price, it allows the firm to collect a higher premium when the highest valuation exceeds v_A but the second-highest valuation does not.

The firm's management will pursue a sale if the price it expects justifies the cost of conducting the sale. This observation yields the following propositions:

Proposition 1: *The equilibrium probability that the firm's management will pursue a sale is strictly increasing in c_F and c_Q,* strictly *decreasing in* ε_0, and *— if and only if* $\psi(x_0)$ *is positive (negative) — strictly increasing (decreasing) in c_V.*

Proof: Consider an increase in an arbitrary parameter z. Applying the envelope theorem to the maximized value of the firm management's expected profit, we see that, for any parameter z,

$$\left.\frac{dE(\pi)}{dZ}\right|_{\sigma^*} = -\frac{dH^{(1)}(\sigma)}{dz}\cdot\sigma - \left.\int_{\sigma}^{\bar{\tau}}\frac{dH^{(2)}(\tau)}{dz}d\tau\right|_{\sigma^*}.$$

In terms of the parameters of the model, note that

$$H^{(1)}(\tau) = F^N(\tau_1(\tau))\cdot G^M(\tau_2(\tau))$$

and that

$$
\begin{aligned}
H^{(2)}(\tau) = {} & F^{N}(\tau_1(\tau)) \cdot G^{M}(\tau_2(\tau)) \\
& + N \cdot F^{N-1}(\tau_1(\tau)) \cdot G^{M}(\tau_2(\tau))(1 - F(\tau_1(\tau))) \\
& + M \cdot F(\tau_1(\tau))^{N} \cdot G(\tau_2(\tau))^{M-1} \cdot (1 - G(\tau_2(\tau))) \\
= {} & F^{N-1}(\tau_1(\tau)) \cdot G^{M-1}(\tau_2(\tau)) \\
& \cdot (NG(\tau_2(\tau)) + MF(\tau_1(\tau)) - (N + M - 1)F(\tau_1(\tau)) \cdot G(\tau_2(\tau))),
\end{aligned}
$$

where

$$
\begin{aligned}
\tau_1(\tau) &= \tau + \varepsilon_0 - c_F - c_Q - c_V \cdot \psi(x_0) \\
\tau_2(\tau) &= \tau + \varepsilon_0 - c_F .
\end{aligned}
$$

Note that both $H^{(1)}(\tau)$ and $H^{(2)}(\tau)$ are strictly increasing in $\tau_1(.)$ and $\tau_2(.)$, so that

$$
\left.\frac{dE(\pi)}{dz}\right|_{s^*} = -\underbrace{\frac{dH^{(1)}(s)}{d\tau_1}}_{(+)} \cdot \frac{d\tau_1}{dz} \cdot s - \underbrace{\frac{dH^{(1)}(s)}{d\tau_2}}_{(+)} \cdot \frac{d\tau_2}{dz} \cdot s - \int_{s}^{\bar{\varepsilon}} \left(\underbrace{\frac{dH^{(2)}(\tau)}{d\tau_1}}_{(+)} \cdot \frac{d\tau_1}{dz} + \underbrace{\frac{dH^{(2)}(\tau)}{d\tau_2}}_{(+)} \cdot \frac{d\tau_2}{dz} \right) d\tau \Bigg|_{s=s^*} .
$$

Finally, it is clear that both $\tau_1(.)$ and $\tau_2(.)$ are strictly increasing in ε_0 and strictly decreasing in c_F. Moreover, $\tau_1(\tau)$ is strictly decreasing in c_Q and — if and only if $\psi(.) > 0$ — strictly decreasing in c_V. These observations yield the result stated in the proposition.

Proposition 2: *The equilibrium probability that the firm will actually be sold is strictly increasing in* c_F and c_Q, *strictly decreasing in* ε_0, and — *if and only if* $\psi(x_0)$ *is positive (negative) — strictly increasing (decreasing) in* c_V.

Proof: As noted above, the probability that the firm's management will pursue a sale is $\Pr\{E(\pi(\sigma^*)) \geq k\} = \Omega(E(\pi(\sigma^*)))$. Because k and all of the ε_i's are independent, the distribution of the highest premium conditional on an auction, $H^{(1)}(\tau \mid k \leq E(\pi(\sigma^*)))$, is equal to the unconditional distribution $H^{(1)}(\tau)$. Therefore, conditional on an auction, the probability that the firm will be sold is equal to the unconditional probability that the highest premium offered will exceed σ^*, or

$$\begin{aligned} & 1 - H^{(1)}(\sigma^*) \\ &= 1 - F^N(\tau_1(\sigma^*)) \cdot G^M(\tau_2(\sigma^*)). \end{aligned}$$

Differentiating this expression with respect to c_F, c_Q, c_V, and ε_0 yields the result stated in the proposition.

Propositions 1 and 2 formalize the "more sales hypothesis" articulated in the introduction. They state that an increase in any cost component will raise the probability of an auction and the probability of an ultimate sale. The reason is that a sale to any acquirer allows the firm to avoid the fixed cost c_F, and a sale to a private acquirer allows the firm to avoid the firm-specific cost c_Q and the variable cost c_V.

It is helpful to think of the marginal firm, whose management is indifferent between pursuing a sale and keeping the firm independent. Let k^* denote this firm's *k*. The corollary below follows:

Corollary 1: *The critical value* k^* characterizing the marginal firm *is strictly increasing in* c_F and c_Q, strictly *decreasing in* ε_0, and — *if and only if* $\psi(x_0)$ *is positive (negative) — strictly increasing (decreasing) in* c_V.

Corollary 1 restates in terms of k^* the observation that, as the net cost of being public increases, a higher sale cost will be needed to deter firm managements from pursuing a sale.

D. Equilibrium Identity of the Acquirer

We now examine the probability that, in the event of a sale, the acquirer will be private. Consider first infra-marginal firms, whose management pursues a sale regardless of an increase in the net cost of being public. For the following results it is helpful to define $v_1(v) = v - x_0 + k$, *and* $v_2(v) = v - x_0 + k + c_Q + c_V \cdot \psi(x_0)$.

Proposition 3: *The probability that an infra-marginal firm, which pursues a sale regardless of an increase in the cost of being public, will be sold to a private acquirer rather than a public one is invariant in* c_F, strictly *increasing in* c_Q, and — if and only if $\psi(x_0)$ *is positive (negative) — strictly increasing (decreasing) in* c_V.

Proof: Because the error terms are assumed to be independently and identically distributed, this conditional probability is identical to the unconditional probability that the highest private acquirer's valuation exceeds the highest public acquirer's valuation:

$$\begin{aligned}\Pr\left\{V_{pub}^{(1)} < V_{priv}^{(1)} \mid \mathbf{X}\right\} &= \int G^{M}\left(v_2(v)\right) dF^{N}\left(v_1(v)\right) \\ &= N \int G^{M}\left(v_2(v)\right) F^{N-1}\left(v_1(v)\right) f\left(v_1(v)\right) dv.\end{aligned}$$

Differentiating the integrand above shows that it is strictly increasing in $v_2(.)$. Moreover, $v_1(.)$ is invariant in all of the cost components, and $v_2(.)$ is invariant in c_F but is increasing in c_Q, and — if $\psi(.)$ is positive (negative) — increasing (decreasing) in c_V. This establishes the claim in the proposition.

Proposition 3 formalizes the "all sales hypothesis" articulated in the introduction. It states that increasing the firm-specific cost or the variable cost of being public skews all sales toward private acquirers. The intuition is similar to the intuition of Propositions 1 and 2: Because only private acquirers avoid the firm-specific cost and the variable cost of being public, private acquirers play a more central role in the acquisitions market as these costs rise.

Consider next marginal firms, whose management pursues a sale only after an increase in the cost of being public.

Proposition 4: *If* $\frac{f'(v_1(v))}{f(v_1(v))} > -\left(M \cdot \frac{g(v_2(v))}{G(v_2(v))} + (N-1) \cdot \frac{f(v_1(v))}{F(v_1(v))}\right)$, *the probability that a marginal firm, which pursues a sale because of an increase in the cost of being public, will be*

sold to a private acquirer rather than a public one is strictly increasing in c_F, strictly *increasing in* c_Q, *and — if and only if* $\psi(x_0)$ *is positive (negative) — strictly increasing (decreasing) in* c_V.

Proof: The proof turns on showing that $\Pr\left\{V_{pub}^{(1)} < V_{priv}^{(1)} \mid \mathbf{X}\right\}$ is increasing in *k*. The reason is that an increase in the cost of being public raises the cutoff k^* at which the firm's management is indifferent about a sale. When the cost of being public increases, marginal firms put on sale will have a higher *k* than infra-marginal firms. Because the probability that the acquirer is private is increasing in *k*, these marginal firms will raise the probability that acquisitions involve private acquirers. Denoting $\Theta(v) \equiv N \cdot G^M(v_2(v)) F^{N-1}(v_1(v)) f(v_1(v))$, the derivative of $\Pr\left\{V_{pub}^{(1)} < V_{priv}^{(1)} \mid \mathbf{X}\right\}$ with respect to *k* is

$$\frac{d}{dk}\int \Theta(v)dv = N\int\left(\frac{d\Theta}{dv_2}\frac{dv_2}{dk}+\frac{d\Theta}{dv_1}\frac{dv_1}{dk}\right)dv$$
$$= N\int\left(\begin{array}{c} M\cdot G^{M-1}(v_2(v))\cdot F(v_1(v))^{N-1}\cdot f(v_1(v))\cdot g(v_2(v)) \\ +G^M(v_2(v))\cdot F^{N-2}(v_1(v))\left[(N-1)\cdot f(v_1(v))^2+F(v_1(v))\cdot f'(v_1(v))\right]\end{array}\right)dv.$$

The condition for the proposition comes from the integrand of the above expression. If at k^* this integrand is strictly positive, the marginal firm will increase the probability that acquisitions involve private acquirers. Simplifying the integrand we find that it takes on a strictly positive value whenever:

$$\frac{f'(v_1(v))}{f(v_1(v))} > -\left(M \cdot \frac{g(v_2(v))}{G(v_2(v))} + (N-1) \cdot \frac{f(v_1(v))}{F(v_1(v))} \right).$$

Because k^* is strictly increasing in c_F and c_Q, and — if and only if $\psi(x_0) > 0$ — strictly increasing in c_V, the proposition follows.

Proposition 4 formalizes the "new sales hypothesis" articulated in the introduction. It states that firms that are sold in response to the increase in the cost of being public are likely to be acquired by private acquirers if there is a sufficiently dense population of private acquirers relative to the population of public acquirers ready to buy firms that pursue a sale to avoid the cost of complying with SOX. This condition is plausible for financial acquirers, which buy firms for investment purposes and are therefore more sensitive to price than strategic acquirers, which buy firms to integrate their operations with their own. While financial acquirers tend to be private for reasons unrelated to SOX, strategic acquirers can be either private or public.

While Proposition 4 is narrower than Proposition 3 in that it applies only to sales triggered by the increase in the cost of being public and only to one type of private acquirers, it is broader than Proposition 3 in that it predicts an increase in the probability that a sale will involve a private acquirer even if only the fixed cost of being public increases.

E. Discussion

The framework above provides testable predictions about whether SOX increased or decreased the net cost of being public. These predictions need not apply uniformly across

all industries. First, industries in which the role of incumbent management is significant should be less affected than other industries. Second, the costs and benefits of SOX need not be the same within a specific industry because firms differ in size. Indeed, the net variable cost $c_V \cdot \psi(x_0)$ explicitly incorporates size heterogeneity. If, as we conjecture, ψ is decreasing in x_0, an increase in c_V will affect small firms more than large firms. In fact, a legal change that increases the net variable cost for small firms can decrease this cost for large firms.