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GOING-PRIVATE DECISIONS AND THE SARBANES-OXLEY ACT OF 2002: A CROSS-COUNTRY ANALYSIS*

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Abstract

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.

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, Dey, and Lys (2005a)). There is also evidence that SOX was associated with a reduction in earnings management (Cohen, Dey, and Lys (2005b)). 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 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 August 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, 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]

Our analysis proceeds as follows. Part I discusses the literature on the effects of SOX. Part II outlines our theoretical framework and empirical strategy, and describes our data. Part III reports our results. Part IV performs a number of robustness checks. Part V concludes.

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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.

I. 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. The results of these studies are mixed. Zhang (2007) finds negative returns. Li, Pincus, and Rego (2004) and Jain and Rezaee (2006) find positive returns but a negative relation between returns and practices that SOX sought to limit. Engel, Hayes, and Wang (2007) find that returns are positively related to market capitalization and stock turnover but do not report whether returns are positive or negative. Litvak (2005) finds that firms cross-listed in the United States experience lower returns than size- and industry-matched firms listed only abroad. Her approach of using foreign firms as a control group is similar to ours, and has the added benefit of comparing two groups of foreign firms. On the other hand, cross-listed firms are not representative of public firms in general and can be uniquely burdened by SOX because they must also comply with the law abroad. Of particular relevance to this article are the findings of Chhaochharia and Grinstein (2007). They find that small firms with ineffective internal controls or boards that are not independent (which are

[3] Kamar, Karaca-Mandic, and Talley (2006) provide a detailed review of the literature.

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.

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, Hayes, and Wang (2007) find a small increase in the incidence of deregistration, and a large increase in the portion of going private in deregistration generally, after SOX. Leuz, Triantis, and Wang (2006) find a large post-SOX increase in the incidence of going dark, but no significant increase in the incidence of going private.

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, Bidwell, and Ortegren (1984), Lerner (1994), Pagano, Panetta, and Zingales (1998), Benninga, Helmantel, and Sarig (2005)). Both of these factors were present around the enactment of SOX.[4]

II. 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 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 helps to separate 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. Because going-dark transactions have no parallel outside the United States, excluding these transactions likely underestimates the impact of SOX.

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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.

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 which 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

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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).

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, Panetta, and Zingales (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.

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, Ge, and McVay (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, Kim, and Rezaee (2004) 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. We extend the basic model to allow the coefficient of *US* × *After* to differ between full and partial acquisitions, between small and large targets, and between acquisitions announced in the first year after the enactment of SOX and acquisitions announced thereafter.[6]

[6] 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 Part III, however, we return to the first decision by investigating whether the number of acquisitions increased after the enactment of SOX.

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, Heckman, and Todd (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.[7] Following Bertrand, Duflo, and Mullainathan (2004) we allow stock exchanges to undergo changes that persist over time by clustering standard errors at the country in which the stock exchange is located.

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-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

[7] 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.

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. Moreover, the most onerous aspect of SOX — the duty under Section 404 to establish effective internal controls — will apply to these firms only in 2007.

Additionally, we distinguish between transactions that involve acquirers seeking to own all of the target's stock (full acquisitions) and transactions that involve acquirers seeking to own only part of the target's stock (partial acquisitions). Full acquisitions mark the line between going private (when they involve private acquirers) and staying public (when they involve public acquirers) and should therefore be affected by SOX.

Our initial sample contains 19,947 announced acquisitions between January 2000 and December 2004. We exclude, in the following order, 1,562 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, 3,200 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, and 3,933 acquisitions lacking information about the target's stock market value. Of the remaining 8,266 acquisitions, 3,333 are full acquisitions and 4,933 are partial acquisitions.

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 75 countries. 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.

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.

III. Results

Table I reports summary statistics. The percentage of small targets is similar in the United States and abroad, and increases in both regions after the enactment of SOX. Focusing on full acquisitions, however, this percentage increases from 12% to 20% in the United States, while decreasing from 8% to 7% abroad. The percentage of acquisitions by private acquirers also increases after the enactment of SOX in both regions. Focusing on full acquisitions of small targets, defined as firms whose market value is in the bottom quartile of the sample ($15 million), this percentage increases from 43% to 56% in the United States, while increasing from 46% to 50% abroad. In Canada and Western Europe, whose markets are arguably more integrated with the American market than the markets in other parts of the world, the percentage of acquisitions by private acquirers out of full acquisitions of small targets decreases after the enactment of SOX from 52% to 47%. 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 I

We start with testing whether the number of full 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 full 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 a negative binomial regression model to account for the

count nature of the dependent variable, while distinguishing between small targets and large ones.

Table II 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 22% post-SOX increase in the average number of small target acquisitions per quarter in the United States from 18 to 22. In contrast, the difference-in-differences estimate is negative and significant for large targets. The results are robust to substituting *After* by quarter fixed effects and substituting *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 II

Next we examine whether SOX increased the probability that small target acquisitions involve private acquirers. We begin our analysis without distinguishing acquisitions according to target size or the proximity of the acquisition to the enactment of SOX. We do distinguish, however, between full acquisitions and partial acquisitions. Full acquisitions are acquisitions in which the acquirer seeks to own all of the target's stock following the transaction. A public target that is fully acquired by a private acquirer exits the public capital market and ceases to be subject to SOX. The same is not true for a public target that is only partially acquired. Even if the acquirer in a partial acquisition is private, the target remains

public and continues to be subject to federal securities law. Accordingly, we expect SOX to affect only full acquisitions. Because full and partial acquisitions are otherwise affected by similar economic conditions, partial acquisitions serve as useful a comparison group (in addition to foreign acquisitions) for isolating the effect of SOX. Accordingly, we estimate the parameters of the probit specification

$$y_{ikt} = \alpha_0 + \alpha_1 US_i \times After_t + \alpha_2 US_i \times After_t \times Full_i \quad (1)$$
$$+ \alpha_3 US_i + \alpha_4 Full_i + \alpha_5 US_i \times Full_i + \beta x_{kt} + \gamma z_i + \delta_k + \eta_t + \varepsilon_{ikt},$$

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, $Full_i$ is an indicator for acquirers seeking to own all of the target's stock, 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.

Table III reports the results. Column (1) assumes that the same changes over time in unobserved economic conditions affect full acquisitions and partial acquisitions. Column (2) relaxes this assumption by adding to the model a set of quarter fixed effects interacted with *Full*. The Wald tests reported in the table do not reject the null hypothesis that SOX affected neither full acquisitions nor partial ones.

Table III

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 our sample ($15 million) and interactions of this indicator: *US* × *Small*, *Full* × *Small*, *US* × *Full* × *Small*, *US* × *After* × *Small*, and *US* × *After* × *Full* × *Small*.

Table IV reports the results. As before, Column (1) assumes that all acquisitions are affected by the same changes over time in unobserved economic conditions. Column (2) relaxes this assumption by adding to the regression model three sets of quarter fixed effects interacted with *Full*, *Small*, and their interaction. 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 full 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 partial acquisitions of small targets and for full acquisitions of large targets. The difference-in-differences estimate is negative and significant for partial acquisitions of large targets, a finding that does not have a clear interpretation within our theoretical framework other than a possible redirection of resources to full acquisitions given the increased benefits of going private. In terms of economic significance, the coefficients reported in Column (2) predict a significant increase from 0.44 to 0.55 in the probability that a full acquisition of a small target involve a private acquirer after the enactment of SOX, and an

insignificant decrease from 0.21 to 0.19 in the probability that a full acquisition of a large target involve a private acquirer.

Table IV

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 interactions of the indicator *After* in Equation (1) by similar interactions with an indicator for acquisitions announced between August 1, 2002 and June 30, 2003 (*Period1*) and similar interactions with an indicator for acquisitions announced between July 1, 2003 and December 31, 2004 (*Period2*).

Table V reports the results. As before, Column (1) assumes that the same unobserved economic conditions affect full and partial acquisitions, while Column (2) relaxes this assumption. In both columns, the difference-in-differences estimate for full acquisitions announced in the first year after the enactment of SOX is positive and significant, consistent with the hypothesis that anticipated SOX compliance costs caused firms to exit the public capital market in that period. The difference-in-differences estimate for partial acquisitions announced more than a year after the enactment of SOX is negative and significant. In contrast, we do not find robust effects for partial acquisitions announced in the first year after the enactment of SOX or full acquisitions announced more than a year after the enactment of SOX.

Table V

Having found a post-SOX increase in going private by small targets (Table IV) and an increase in going private in the first year after the enactment of SOX (Table V), 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 V for a sample of small target acquisitions.

Table VI reports the results. As before, Column (1) assumes that the same unobserved economic conditions affect full and partial acquisitions, while Column (2) relaxes this assumption. In both columns, we find that the probability of acquisition by a private acquirer is significantly higher for full 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 in Column (2) from 0.43 to 0.66.[8] In contrast, we do not find a robust effect for full acquisitions announced more than a year after the enactment of SOX or for partial acquisitions announced at any time after the enactment of SOX. 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.

Table VI

IV. Robustness Checks and Hypotheses Testing

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

[8] The figures 0.43 and 0.66 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.

A. Modifying the Control Group

Table VII presents sensitivity analyses of the specification reported in Table IV. Column (1) reproduces Column (2) of Table IV. 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 0.95, and the corresponding correlation between the stock indexes in the United States and Canada is 0.89. 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 0.15.

Table VII

As Table VII suggests, our results are robust. Indeed, the difference-in-differences estimate for full 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 much smaller than our original sample. In fact, all of the specifications, not just the one reported in Table IV, are robust to constraining the control group to Canada and Western European countries. [9]

B. Modifying the Definition of a Small Firm

Next, we conduct robustness checks of our definition of a small firm. Table VIII reports our results. Column (1) of Table VIII reproduces Column (2) of Table IV, which classifies a target as small if its CPI-adjusted stock market value four weeks before the acquisition is announced was less than $15 million 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 ($18 million and $12 million, respectively), and classify a target as small based on the bottom quartile in the period its acquisition was announced. Column (2) reports the results of using this classification. Column (3) reports the results of using $30 million as a value cutoff instead of $15 million. The estimates in Columns (1) through (3) are similar. As we further increase the

[9] Parameter estimates are available upon request.

value cutoff to $50 million (Column (4)) or $75 million (Column (5)), the small target effect disappears. Column (6) addresses the possibility that a small firm in one market will be considered to be large in other markets. Specifically, we define 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 exchange. The results are similar to those in Column (1).

Table VIII

C. Controlling for the Availability of Private Equity

As a final robustness check, we investigate the possibility that our results are driven by an increase in the availability of private equity in the United States relative to other countries after the enactment of SOX. We do so by examining a sample of acquisitions by private acquirers. If SOX led firms to exit the public capital market, we would expect private acquirers to develop a taste for public targets after the enactment. Accordingly, we estimate a variation of the regression model reported in Table IV 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 IX reports the results for a sample of acquisitions by private acquirers. Column (1) presents the results we obtain when we define a small target as one with a CPI-adjusted stock market value of less than $15 million, corresponding to the bottom quartile of the stock market value distribution in the whole sample. Column (2) presents the results we obtain

when we use $18 million as a value cutoff for acquisitions announced before the enactment of SOX, and $12 million for acquisitions announced thereafter. In both columns, the difference-in-differences estimates for full acquisitions of small targets are positive. 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 0.27 to 0.36 in the probability of purchasing a small public target rather than a small private target after the enactment of SOX, and a barely significant increase from 0.51 to 0.56 in the probability of purchasing a large public target rather than a large private target.

Table IX

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 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 IV 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 X presents the results. Column (1) reproduces Column (2) of Table IV. In Column (2), which excludes financial acquirers, the small target effect for full acquisitions

disappears. In contrast, in Column (3), which excludes strategic acquirers, the small target effect for full acquisitions becomes stronger both in magnitude and in statistical significance. These findings suggest that the "new sales hypothesis" is the driving force behind our results.

Table X

Second, we test the "all sales hypothesis" separately. This hypothesis predicts that SOX would reduce the propensity of public acquirers to buy any target — public or private — because an acquisition would transfer to them the target's SOX obligations. In other words, the "all sales hypothesis" focuses on acquirers' reluctance to expand SOX obligations, rather than targets' desire to avoid them (the focus of the "new sales hypothesis"), and so it should apply to private target acquisitions as well. We test this prediction by estimating the regression model reported in Table IV for a sample of full 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 XI reports our 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 private acquirer rather than a public one changes after the enactment of SOX. These findings, like the ones in Table X, suggest that the "new sales hypothesis" is the driving force behind our results.

Table XI

V. Conclusion

In this article, we have reported evidence consistent with the hypothesis that the Sarbanes-Oxley Act of 2002 disproportionately burdens small firms. In particular, using full acquisitions of foreign targets and partial acquisitions as control groups, 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 have not found a similar effect for large targets. These results have been robust in a number of alternative specifications.

We have 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 have 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 their financial integrity, it could benefit firms that remained public enough to justify this cost. Finally, the disappearance of the SOX effect after a year leaves open the possibility that the cost associated with SOX was temporary. This article sheds light on an important piece of this puzzle.

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Table I: 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	1,458	667	2,395
Market value ($1,000,000)			
Mean	853	712	1,273
Standard deviation	4,310	2,879	30,064
% stock the acquirer seeks to own			
Mean	76	82	54
Standard deviation	38	32	39
% small targets	20	23	23
% full acquisitions	67	72	35
% full acquisitions of small targets	12	15	8
% private acquirers	36	46	47
% private acquirers in full acqusitions of small targets	43	52	46

Panel B: Acquisitions Announced Between August 1, 2002 and December 31, 2004			
	United States	W. Europe & Canada	All Abroad
Number of observations	925	1,007	3,488
Market value ($1,000,000)			
Mean	1,187	783	624
Standard deviation	15,964	5,559	10084
% stock the acquirer seeks to own			
Mean	83	58	42
Standard deviation	32	41	37
% small targets	29	34	29
% full acquisitions	73	43	24
% full acquisitions of small targets	20	12	7
% private acquirers	42	55	56
% private acquirers in full acquisitions of small targets	56	47	50

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

This table reports the results of estimating a negative binomial regression in which the dependent variable is the number of full 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 less than $15 million, corresponding to the bottom quartile of stock market value distribution in the sample. 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	3.59 ***	(0.13)	3.47 ***	(0.22)
Small	–0.76 ***	(0.13)	–1.34 **	(0.23)
US × Small	–0.71 ***	(0.13)	–0.67 ***	(0.13)
US × After	–0.41 ***	(0.09)	–0.38 ***	(0.09)
US × After × Small	0.63 ***	(0.11)	0.61 ***	(0.10)
After	Included		–	
After × Small	Included		–	
Quarter fixed effects	–		Included	
Quarter fixed effects × Small	–		Included	
Country fixed effects	Included		Included	
Number of observations	427		427	

Panel B: Difference-in-Differences Estimates

	Coeff.	p-value	Coeff.	p-value
Acquisitions of small targets				
US × After + US × After × Small	0.22 **	(0.05)	0.23 **	(0.02)
Acquisitions of large targets				
US × After	–0.41 ***	(0.00)	–0.38 ***	(0.00)

Table III: 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 less than $15 million, corresponding to the bottom quartile of stock market value distribution in the sample. Full is an indicator for acquisitions designed to result in the acquirer owning all of the target's stock. 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)	
	Coeff.	Std. Error	Coeff.	Std. Error
US	0.28 *	(0.16)	0.20	(0.17)
Full	–0.47 ***	(0.11)	–0.46 ***	(0.16)
US × Full	–0.63 ***	(0.11)	–0.65 ***	(0.14)
US × After	–0.09	(0.06)	–0.10	(0.08)
US × After × Full	0.16 ***	(0.01)	0.17 **	(0.09)
Log of stock price index	0.09	(0.06)	0.08	(0.16)
Quarter fixed effects	Included		Included	
Quarter fixed effects × Full	–		Included	
Industry fixed effects	Included		Included	
Number of observations	8,240		8,240	

Panel B: Difference-in-Differences Estimates				
	Coeff.	p-value	Coeff.	p-value
Full acquisitions				
US × After + US × After × Full	0.07	(0.30)	0.07	(0.28)
Partial acquisitions				
US × After	–0.09	(0.14)	–0.10	(0.23)

Table IV: 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 less than $15 million, corresponding to the bottom quartile of stock market value distribution in the sample. Full is an indicator for acquisitions designed to result in the acquirer owning all of the target's stock. 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	–0.16 ***	(0.06)	–0.16 **	(0.06)	–0.18 **	(0.08)
US × After × Full	0.12 ***	(0.01)	0.09	(0.08)	0.09	(0.08)
US × After × Small	0.24 ***	(0.02)	0.24	(0.15)	0.26 *	(0.15)
US × After × Full × Small	–0.03	(0.02)	0.11	(0.18)	0.08	(0.18)
US	0.35 **	(0.17)	–0.04	(0.13)	0.07	(0.23)
Full	–0.45 ***	(0.12)	–0.24 ***	(0.27)	0.63 ***	(0.15)
US × Full	–0.76 ***	(0.12)	–0.75 ***	(0.15)	–0.75 ***	(0.15)
Small	0.33 ***	(0.08)	0.58 *	(0.33)	0.59 *	(0.32)
US × Small	–0.11	(0.09)	–0.08	(0.12)	–0.10	(0.12)
Full × Small	–0.05	(0.09)	–0.40	(0.50)	–0.44	(0.48)
US × Full × Small	0.53 ***	(0.1)	0.43 ***	(0.16)	0.47 ***	(0.15)
Log of stock price index	0.13	(0.16)	0.15	(0.16)	–0.01	(0.53)
Quarter fixed effects	Included		Included		Included	
Quarter fixed effects × Full	–		Included		Included	
Quarter fixed effects × Small	–		Included		Included	
Quarter fixed effects × Full × Small	–		Included		Included	
Quarter fixed effects × Log of stock price index	–		–		Included	
Industry fixed effects	Included		Included		Included	
Number of observations	8,240		8,240		8,240	

Panel B: Difference-in-Differences Estimates

	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Full acquisitions of small targets						
US × After + US × After × Full						
+ US × After × Small + US × After × Full × Small	0.17 ***	(0.00)	0.28 **	(0.02)	0.25 **	(0.04)
Full acquisitions of large targets						
US × After + US × After × Full	–0.03	(0.57)	–0.07	(0.23)	–0.09	(0.11)
Partial acquisitions of small targets						
US × After + US × After × Small	0.08	(0.17)	0.08	(0.62)	0.08	(0.66)
Partial acquisitions of large targets						
US × After	–0.16 ***	(0.01)	–0.16 ***	(0.01)	–0.18 **	(0.03)

Table V: 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 less than $15 million, corresponding to the bottom quartile of stock market value distribution in the sample. Full is an indicator for acquisitions designed to result in the acquirer owning all of the target's stock. 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

	(1)		(2)	
	Coeff.	Std. Error	Coeff.	Std. Error
US × Period1	0.11 *	(0.06)	0.10	(0.07)
US × Period1 × Full	0.20 ***	(0.02)	0.22 **	(0.10)
US × Period2	–0.22 ***	(0.07)	–0.23 **	(0.10)
US × Period2 × Full	0.12 ***	(0.01)	0.12	(0.12)
US	–0.15	(0.13)	–0.14	(0.14)
Full	–0.47 ***	(0.11)	–0.54 ***	(0.19)
US × Full	–0.63 ***	(0.11)	–0.64 ***	(0.14)
Log of stock price index	0.08	(0.17)	0.08	(0.16)
Quarter fixed effects	Included		Included	
Quarter fixed effects × Full	–		Included	
Industry fixed effects	Included		Included	
Number of observation	8,240		8,240	

Panel B: Difference-in-Differences Estimates

	Coeff.	p-value	Coeff.	p-value
Full acquisitions announced in Period1				
US × Period1 + US × Period1 × Full	0.31 ***	(0.00)	0.32 ***	(0.00)
Full acquisitions announced in Period2				
US × Period2 + US × Period2 × Full	–0.10	(0.15)	–0.11	(0.15)
Partial acquisitions announced in Period1				
US × Period1	0.11 *	(0.06)	0.10	(0.17)
Partial acquisitions announced in Period2				
US × Period2	–0.22 ***	(0.00)	–0.23 **	(0.02)

Table VI: 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. 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 less than $15 million, corresponding to the bottom quartile of stock market value distribution in the sample. Full is an indicator for acquisitions designed to result in the acquirer owning all of the target's stock. 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

	(1)		(2)	
	Coeff.	Std. Error	Coeff.	Std. Error
US × Period1	0.28 **	(0.12)	0.20	(0.16)
US × Period1 × Full	0.16 ***	(0.04)	0.39	(0.25)
US × Period2	–0.02	(0.13)	–0.06	(0.17)
US × Period2 × Full	0.09 **	(0.04)	0.03	(0.22)
US	0.45 **	(0.18)	0.34	(0.23)
Full	–0.47 ***	(0.12)	–0.30	(0.31)
US × Full	–0.30 **	(0.13)	–0.37 **	(0.19)
Log of stock price index	0.13	(0.32)	0.15	(0.32)
Quarter fixed effects	Included		Included	
Quarter fixed effects × Full	–		Included	
Industry fixed effects	Included		Included	
Number of observations	2,067		2,067	

Panel B: Difference-in-Differences Estimates

	Coeff.	p-value	Coeff.	p-value
Full acquisitions announed in Period1				
US × Period1 + US × Period1 × Full	0.44 ***	(0.00)	0.59 ***	(0.00)
Full acquisitions announced in Period2				
US × Period2 + US × Period2 × Full	0.07	(0.59)	–0.03	(0.86)
Partial acquisitions announced in Period1				
US × Period1	0.28 **	(0.02)	0.20	(0.22)
Partial acquisitions announced in Period2				
US × Period2	–0.02	(0.88)	–0.06	(0.71)

Table VII: 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. The significance (*p*-value) of these estimates based on Wald tests is provided in parentheses. Column (1) reproduces column (2) of Table IV. 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 less than $15 million, corresponding to the bottom quartile of stock market value distribution in the sample. Full is an indicator for acquisitions designed to result in the acquirer owning all of the target's stock. 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 IV (1)	Acquirers With Multiple Parents Excluded (2)	U.S., Canada, and Western Europe Only (3)	U.S. and Canada (4)
Full acquisitions of small targets				
US × After + US × After × Full				
+ US × After × Small	0.28**	0.30**	0.52***	1.06**
+ US × After × Full × Small	(0.02)	(0.02)	(0.01)	(0.02)
Full acquisitions of large targets				
US × After + US × After × Full	–0.07	–0.04	–0.13	–0.36***
	(0.23)	(0.52)	(0.11)	(0.01)
Partial acquisitions of small targets				
US × After + US × After × Small	0.08	–0.02	–0.05	–0.21***
	(0.62)	(0.93)	(0.83)	(0.00)
Partial acquisitions of large targets				
US × After	–0.16***	–0.19***	–0.27**	–0.09***
	(0.01)	(0.00)	(0.02)	(0.01)
Number of observations	8,240	7,780	4,056	2,589

Table VIII: 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. The significance (*p*-value) of these estimates based on Wald tests is provided in parentheses. Column (1) reproduces column (2) of Table IV. Columns (2) to (6) report the results of estimating the same specification for different definitions of target size. In Columns (1), (3), (4), and (5), 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 (corresponding to the bottom quartile of stock market value distribution in the sample), $30 million, $50 million, and $75 million, respectively. In column (6), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is less than the bottom quartile of the market distribution in its primary exchange. 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 less than $18 million for acquisition announced before the enactment of SOX, and $12 million for acquisitions announced after the enactment of SOX, corresponding to the bottom quartile of stock market value distribution in each period. US is an indicator for acquisitions of targets primarily listed in the United States. Full is an indicator for acquisitions designed to result in the acquirer owning all of the target's stock. 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 < $15m (1)	Market Value <$18m pre-SOX; <$12m post-SOX (2)	Market Value < $30m (3)	Market Value < $50m (4)	Market Value < $75m (5)	Market Value < Bottom Quartile in Primary Exchange (6)
Full acquisitions of small targets						
US × After + US × After × Full						
+ US × After × Small	0.28**	0.34**	0.33***	0.19*	0.14	0.28**
+ US × After × Full × Small	(0.02)	(0.02)	(0.00)	(0.08)	(0.15)	(0.02)
Full acquisitions of large targets						
US × After + US × After × Full	–0.07	–0.03	–0.14**	–0.15**	–0.15*	–0.08
	(0.23)	(0.61)	(0.03)	(0.04)	(0.07)	(0.20)
Partial acquisitions of small targets						
US × After + US × After × Small	0.08	0.04	–0.03	–0.00	–0.05	0.15
	(0.62)	(0.77)	(0.82)	(0.99)	(0.59)	(0.15)
Partial acquisitions of large targets						
US × After	–0.16***	–0.15**	–0.14*	–0.13*	–0.09	–0.17**
	(0.01)	(0.01)	(0.10)	(0.07)	(0.24)	(0.04)

Table IX: 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. 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. Full is an indicator for acquisitions designed to result in the acquirer owning all of the target's stock. 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, corresponding to the bottom quartile of stock market value distribution in the sample. 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 less than $18 million for acquisition announced before the enactment of SOX, and $12 million for acquisitions announced after the enactment of SOX, corresponding to the bottom quartile of stock market value distribution in each period. Unreported regressors include quarter, industry and country fixed effects, and interaction of quarter fixed effects with indicators for Small, Full and Small, and Full. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates

Definition of Small	Market Value < $15m (1)		Market Value < $18m pre-SOX; < $12m post-SOX (2)	
	Coeff.	Std. Error	Coeff.	Std. Error
US × After	–0.38 ***	(0.08)	–0.32 ***	(0.08)
US × After × Full	0.50 ***	(0.14)	0.50 ***	(0.13)
US × After × Small	0.11	(0.17)	0.30 *	(0.17)
US × After × Full × Small	0.05	(0.22)	–0.18	(0.19)
US	–7.01 ***	(0.06)	–7.24 ***	(0.08)
Full	–0.36	(0.23)	–0.55 **	(0.25)
US x Full	–0.32 **	(0.15)	–0.28 *	(0.15)
Small	–0.65 ***	(0.21)	–0.86 ***	(0.22)
US × Small	0.85 ***	(0.13)	0.85 ***	(0.11)
Full × Small	–0.31	(0.23)	–0.04	(0.32)
US × Full × Small	–0.41 ***	(0.13)	–0.45 ***	(0.11)
Number of observations	7,450		7,450	

Panel B: Difference-in-Differences Estimates

	Coeff.	p-value	Coeff.	p-value
Full acquisitions of small targets				
US × After + US × After × Full + US × After × Small + US × After × Full × Small	0.29 ***	(0.00)	0.29 ***	(0.00)
Full acquisitions of large targets				
US × After + US × After × Full	0.13	(0.21)	0.17 *	(0.08)
Partial acquisitions of small targets				
US × After + US × After × Small	–0.27 **	(0.05)	–0.03	(0.86)
Partial acquisitions of large targets				
US × After	–0.38 ***	(0.00)	–0.32 ***	(0.00)

Table X: 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. The significance (*p*-value) of these estimates based on Wald tests is provided in parentheses. Column (1) reproduces column (2) of Table IV. Column (2) reports the results of estimating the same specification excluding all financial buyers. Column (3) reports the results of estimating the same specification excluding all 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 less than $15 million. Full is an indicator for acquisitions designed to result in the acquirer owning all of the target's stock. 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 IV (1)	Financial Acquirers Excluded (2)	Strategic Acquirers Excluded (3)
Full acquisitions of small targets			
US × After + US × After × Full			
+ US × After × Small	0.28**	0.03	1.44***
+ US × After × Full × Small	(0.02)	(0.86)	(0.00)
Full acquisitions of large targets			
US × After + US × After × Full	–0.07	0.04	–0.06
	(0.23)	(0.64)	(0.62)
Partial acquisitions of small targets			
US × After + US × After × Small	0.08	–0.70***	1.38***
	(0.62)	(0.00)	(0.00)
Partial acquisitions of large targets			
US × After	–0.16***	–0.29***	–0.08
	(0.01)	(0.00)	(0.42)
Number of observations	8,240	4,906	3,251

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

This table reports the results of estimating a probit model on a sample of fully acquired 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 (2), Small is an indicator for acquisitions of targets whose CPI-adjusted stock market value four weeks before the acquisition is announced is less than $18 million for acquisition announced before the enactment of SOX, and $12 million for acquisitions announced after the enactment of SOX, corresponding to the bottom quartile of stock market value distribution in each period. Unreported regressors include quarter, industry, and country fixed effects, and interaction of quarter fixed effects with indicators for Small, Full and Small, and Full. Significance (*p*-value): * 10%, ** 5%, *** 1%.

Panel A: Coefficient Estimates

Definition of Small	Market Value < $15m (1)		Market Value < $18m pre-SOX; < $12m post-SOX (2)	
	Coeff.	Std. Error	Coeff.	Std. Error
US × After	0.22	(0.14)	0.17	(0.13)
US × After × Small	–0.20 **	(0.09)	–0.13	(0.09)
US	–5.49 ***	(0.06)	–5.65 ***	(0.07)
Small	–0.19	(0.14)	0.12	(0.16)
US × Small	0.00	(0.11)	–0.02	(0.11)
Number of observations	10,616		10,616	

Panel B: Difference-in-Differences Estimates

	Coeff.	p-value	Coeff.	p-value
Small targets				
US × After + US × After × Small	0.02	(0.82)	0.04	(0.63)
Large targets				
US × After	0.22	(0.11)	0.17	(0.20)

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 firm. We assume that both x_0 and ε_0 are common knowledge.[13]

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 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.

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

Public acquirers derive benefits from being public but also bear costs of complying with SOX regardless of whether they make an acquisition.[14] 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 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;

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[14] 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.

however, as we explain in Section V below, it can yield a prediction that small firms and large firms will react differently to SOX.[15]

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.[16]

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

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[15] 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

[16] Vickrey, William W., 1962, Auction and bidding games, in Recent Advances in Game Theory (Princeton University Conference, Princeton, NJ) 15–27. 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, Inc.*, 506 A.2d 173 (Del. 1986); *Paramount Communications, Inc. v. QVC Network, Inc.*, 637 A.2d 34 (Del. 1994).

$$v_{NA} = x_0 + \varepsilon_0 - \left(c_F + c_Q + c_V \cdot \psi\left(x_0\right)\right). \tag{1}$$

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:

$$\begin{aligned} v_A &= v_{NA} - k \\ &= x_0 - k + \varepsilon_0 - \left(c_F + c_Q + c_V \cdot \psi\left(x_0\right)\right). \end{aligned} \tag{2}$$

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 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

$$V_i^{priv} = x_0 - k + \varepsilon_i, \tag{3}$$

for $i \in \{1,...,N\}$. None of the costs and benefits of being public enter in here because the acquirer is private.[17] The premium τ_i^{priv} that a private acquirer i will be willing to pay over the firm management's reservation value is

$$\begin{aligned} \tau_i^{priv} &= V_i^{priv} - v_A \\ &= \varepsilon_i - \varepsilon_0 + c_F + c_Q + c_V \cdot \psi(x_0). \end{aligned} \tag{4}$$

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

$$V_i^{pub} = x_0 - k + \varepsilon_i - c_Q - c_V \cdot \psi(x_0). \tag{5}$$

[17] 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.

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

$$\begin{aligned} \tau_i^{pub} &= V_i^{pub} - v_A \\ &= \varepsilon_i - \varepsilon_0 + c_F \,. \end{aligned} \tag{6}$$

Note that for private 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

$$\pi(\sigma) = \begin{cases} \tau^{(2)} & \text{if } \sigma < \tau^{(2)} \\ \sigma & \text{if } \sigma \in \left[\tau^{(2)}, \tau^{(1)}\right] \\ 0 & \text{if } \sigma > \tau^{(1)} \end{cases}. \tag{7}$$

Consequently, the firm shareholders' expected profit is equal to

$$\begin{aligned} E(\pi(\sigma)) &= \Pr\left\{\sigma \in \left[\tau^{(2)}, \tau^{(1)}\right]\right\} \cdot \sigma + \Pr\left\{\sigma < \tau^{(2)}\right\} \cdot E\left\{\tau^{(2)} \mid \sigma < \tau^{(2)}\right\} \\ &= \left(H^{(2)}(\sigma) - H^{(1)}(\sigma)\right) \cdot \sigma + \int_{\sigma}^{\bar{\tau}} \tau \cdot h^{(2)}(\tau) d\tau \\ &= \bar{\tau} - H^{(1)}(\sigma) \cdot \sigma - \int_{\sigma}^{\bar{\tau}} H^{(2)}(\tau) d\tau. \end{aligned} \tag{8}$$

Differentiating with respect to σ yields

$$\frac{dE(\pi)}{d\sigma} = -H^{(1)}(\sigma) - h^{(1)}(\sigma)\cdot\sigma + H^{(2)}(\sigma) = 0$$
$$\Leftrightarrow \tag{9}$$
$$\sigma^* = \frac{H^{(2)}(\sigma) - H^{(1)}(\sigma)}{h^{(1)}(\sigma)} > 0.$$

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,

$$\left.\frac{dE(\pi)}{dZ}\right|_{\sigma^*} = -\frac{dH^{(1)}(\sigma)}{dz}\cdot\sigma - \left.\int_{\sigma}^{\bar{\tau}}\frac{dH^{(2)}(\tau)}{dz}d\tau\right|_{\sigma^*}. \tag{10}$$

In terms of the parameters of the model, note that

$$H^{(1)}(\tau) = F^{N}(\tau_1(\tau))\cdot G^{M}(\tau_2(\tau)) \tag{11}$$

and that

$$\begin{aligned} H^{(2)}(\tau) = {} & F^{N}(\tau_1(\tau))\cdot G^{M}(\tau_2(\tau)) \\ & + N\cdot F^{N-1}(\tau_1(\tau))\cdot G^{M}(\tau_2(\tau))(1-F(\tau_1(\tau))) \\ & + M\cdot F(\tau_1(\tau))^{N}\cdot G(\tau_2(\tau))^{M-1}\cdot(1-G(\tau_2(\tau))) \\ = {} & F^{N-1}(\tau_1(\tau))\cdot G^{M-1}(\tau_2(\tau)) \\ & \cdot(NG(\tau_2(\tau)) + MF(\tau_1(\tau)) - (N+M-1)F(\tau_1(\tau))\cdot G(\tau_2(\tau))), \end{aligned} \tag{12}$$

where

$$\begin{aligned} \tau_1(\tau) &= \tau + \varepsilon_0 - c_F - c_Q - c_V\cdot\psi(x_0) \\ \tau_2(\tau) &= \tau + \varepsilon_0 - c_F. \end{aligned} \tag{13}$$

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

$$\left.\frac{dE(\pi)}{dz}\right|_{s^*} = -\underbrace{\frac{dH^{(1)}(s)}{d\tau_1}}_{(+)}\cdot\frac{d\tau_1}{dz}\cdot s - \underbrace{\frac{dH^{(1)}(s)}{d\tau_2}}_{(+)}\cdot\frac{d\tau_2}{dz}\cdot s - \int_s^{\bar{\varepsilon}}\left(\underbrace{\frac{dH^{(2)}(\tau)}{d\tau_1}}_{(+)}\cdot\frac{d\tau_1}{dz} + \underbrace{\frac{dH^{(2)}(\tau)}{d\tau_2}}_{(+)}\cdot\frac{d\tau_2}{dz}\right)d\tau\Bigg|_{s=s^*}. \quad (14)$$

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

$$\begin{aligned} &1 - H^{(1)}(\sigma^*) \\ &= 1 - F^N(\tau_1(\sigma^*))\cdot G^M(\tau_2(\sigma^*)). \end{aligned} \quad (15)$$

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:

$$\begin{aligned} \Pr\left\{V_{pub}^{(1)} < V_{priv}^{(1)} \mid \mathbf{X}\right\} &= \int G^M(v_2(v))\, dF^N(v_1(v)) \\ &= N \int G^M(v_2(v)) F^{N-1}(v_1(v)) f(v_1(v))\, dv. \end{aligned} \tag{16}$$

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

$$\begin{aligned} \frac{d}{dk}\int \Theta(v)dv &= N\int \left(\frac{d\Theta}{dv_2}\frac{dv_2}{dk} + \frac{d\Theta}{dv_1}\frac{dv_1}{dk}\right)dv \\ &= N\int \left(\begin{array}{c} M \cdot G^{M-1}(v_2(v)) \cdot F(v_1(v))^{N-1} \cdot f(v_1(v)) \cdot g(v_2(v)) \\ + G^M(v_2(v)) \cdot F^{N-2}(v_1(v))\left[(N-1) \cdot f(v_1(v))^2 + F(v_1(v)) \cdot f'(v_1(v))\right] \end{array}\right)dv. \end{aligned} \tag{17}$$

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:

$$\frac{f'(v_1(v))}{f(v_1(v))} > -\left(M \cdot \frac{g(v_2(v))}{G(v_2(v))} + (N-1) \cdot \frac{f(v_1(v))}{F(v_1(v))} \right). \tag{18}$$

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.