

# Defensive Management: Does the Sarbanes-Oxley Act Discourage Corporate Risk-Taking?

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# Defensive Management: Does the Sarbanes-Oxley Act Discourage Corporate Risk-Taking?

## Abstract

Prior studies find that foreign firms subject to the Sarbanes-Oxley Act (“SOX”) suffered significant declines in market valuation; these declines are too large to be fully explained by the increased costs of compliance. This paper investigates one possible source of losses – the charge that SOX discourages corporate risk-taking. I use a triple difference methodology to estimate the effect of SOX on risk-taking by SOX-exposed foreign firms. I match each foreign cross-listed firm to a similar non-cross-listed firm from the same country based on propensity to cross list. I measure the “pair” risk – the difference between the risk of a cross-listed firm and the risk of its match (first difference). I then estimate the after-minus-before SOX change in pair risk (second difference). Finally, I compare the after-minus-before changes in pair risk for SOX-exposed pairs (where the cross-listed company is listed on level 2 or 3 and is thus subject to SOX) to the change for SOX-unexposed pairs (where the cross-listed company is listed on level 1 or 4 and is thus not subject to SOX) (third difference). I use three sets of proxies for risk: volatility of returns, financial leverage, and cash hoarding. I find that the risk of SOX-exposed foreign firms declined significantly after SOX on all three measures. High-Tobin’s  $Q$  firms suffered larger declines in risk. I also find some evidence of differential compliance with SOX: size is a negative predictor of changes in risk levels only in low-GDP firms, where only larger, more visible firms are likely expected to comply. Finally, I also find that firms that were riskier before SOX lost more of their value after SOX, as measured by changes in firm Tobin’s  $q$ . This evidence is consistent with the view that SOX induced cross-listed firms to take fewer risks, and placed a particular burden on riskier and well-governed firms.

# 1. Introduction

The Sarbanes-Oxley Act of 2002 (“SOX”)<sup>1</sup> is commonly cited as the single most important U.S. business legislation since the 1930s.<sup>2</sup> It regulates virtually every profession dealing with public corporations – corporate directors and officers, lawyers, accountants, auditors, securities analysts, financial advisors, and so forth. It affects financial market institutions (stock exchanges, credit rating agencies, investment banks); industry organizations (the American Institute of Certified Public Accountants, the Financial Accounting Standards Board), and government bodies (the Securities and Exchange Commission, the Federal Sentencing Commission).

Six years after its adoption, SOX remains highly controversial. Businessmen mostly loathe it, and many academics concur. Major figures in the legal academy have labeled SOX as “quack corporate governance,”<sup>3</sup> a “debacle,”<sup>4</sup> “deeply flawed ... policies that have no empirical support or economic justification,”<sup>5</sup> representing “the point where the costs of regulation clearly exceed its benefits,”<sup>6</sup> with its passage through the Congress called “Sudden Acute Regulatory Syndrome,”<sup>7</sup> “legislating in haste,”<sup>8</sup> and “a hasty, panicked reaction of an electorate looking for an easy fix to the apparent ‘problem’ that

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<sup>1</sup> Pub. L. No. 107-204, 116 Stat. 745 (codified in scattered sections of 11, 15, 18, 28, and 29 U.S.C.).

<sup>2</sup> According to President George W. Bush, SOX is “the most far-reaching reform[] of American business practices since the time of Franklin Delano Roosevelt.” See Elisabeth Bumiller, *Bush Signs Bill Aimed at Fraud in corporations*, N.Y. TIMES (July 31, 2002). Former SEC Commissioner Harvey Goldschmid called it the “most sweeping reform since the Depression-era securities laws.” Shanon D. Murray, *Is SEC Ready for Its Own Sweeping Changes?*, N.Y.L.J. (Aug 29, 2002).

<sup>3</sup> Roberta Romano, *The Sarbanes-Oxley Act and the Making of Quack Corporate Governance*, 114 YALE L.J. 1521 (2005).

<sup>4</sup> Henry N. BUTLER & LARRY E. RIBSTEIN, *THE SARBANES-OXLEY DEBACLE: WHAT WE’VE LEARNED; HOW TO FIX IT* (2006).

<sup>5</sup> Stephen M. Bainbridge, *The Creeping Federalization of Corporate Law*, REGULATION, Spring 2003, at 26.

<sup>6</sup> William J. Carney, *The Costs of Being Public After Sarbanes-Oxley: The Irony of “Going Private,”* 55 EMORY L.J. 141, 141 (2006).

<sup>7</sup> Larry E. Ribstein, *Sarbox: The Road to Nirvana*, 2004 MICH. ST. L. REV. 279; see also Larry E. Ribstein, *Bubble Law*, 40 HOUS. L. REV. 77, 89 (2003) (“regulating in a panic”).

<sup>8</sup> Stephen M. Bainbridge, *Sarbanes-Oxley: Legislating in Haste, Repenting in Leisure* (UCLA School of Law, Law-Econ Research Paper No. 06-14), available at: <http://ssrn.com/abstract=899593>

stock prices go down as well as up.”<sup>9</sup> A report by the "Paulson Committee," an ad hoc Committee on Capital Markets Regulation created by Treasury Secretary Henry Paulson and staffed by prominent academics, argues that SOX is hurting the competitiveness of American firms and stock markets.<sup>10</sup>

Not everyone shares this view. Prominent scholars in both law and finance have opined that the U.S. remains the leader in adopting value-increasing corporate governance rules, that SOX did no harm to this status,<sup>11</sup> and that compliance costs are coming down as companies and accountants gain experience with the new rules.<sup>12</sup> Others saw value in SOX from the start, describing SOX as needed “damage control”,<sup>13</sup> “a step in the right direction,”<sup>14</sup> and welcomed it for “helping strengthen emerging norms of active monitoring by directors and officers.”<sup>15</sup> Some scholars applauded SOX as benefiting not only “corporations and their shareholders but their constellation of constituents as well.”<sup>16</sup> The criminal provisions of SOX were expected to provide

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<sup>9</sup> Robert W. Hamilton, *The Crisis in Corporate Governance: 2002 Style*, 40 HOUS. L. REV. 1, 49 (2003).

<sup>10</sup> Committee on Capital Markets Regulation, Interim Report (Nov. 30, 2006), [http://www.capmksreg.org/pdfs/11.30Committee\\_Interim\\_ReportREV2.pdf](http://www.capmksreg.org/pdfs/11.30Committee_Interim_ReportREV2.pdf); see also Luigi Zingales, *Is the U.S. Capital Market Losing its Competitive Edge?*, J. ECON. PERSPECTIVES (forthcoming 2007); Michael Bloomberg and Charles Schumer, “Sustaining New York’s and the U.S.’s Global Financial Services Leadership” (January 22, 2007) (Mr. Bloomberg is Mayor of New York City and Mr. Schumer is a member of the House of Representatives from New York City).

<sup>11</sup> Craig Doidge, Andrew Karolyi, and Rene M. Stulz, *Has New York Become Less Competitive in Global Markets? Evaluating Foreign Listing Choices over Time* (working paper 2007), available on SSRN at <http://ssrn.com/abstract=982193>; John C. Coffee, Jr., *Law and the Market: The Impact of Enforcement* (working paper 2007), available on SSRN at <http://ssrn.com/abstract=967482>. See also Robert A. Prentice and David B. Spence, *Sarbanes-Oxley as Quack Corporate Governance: How Wise is the Received Wisdom?* (working paper, 2006), available at <http://srn.com/abstract=945796>.

<sup>12</sup> E.g., Coffee (2007), *supra* note xxx; John C. Coates, IV, *The Goals and Promise of the Sarbanes-Oxley Act*, J ECON. PERSPECTIVES, Winter 2007, at 91-116 (“Sarbanes-Oxley should bring net long-term benefits”).

<sup>13</sup> Larry Cata Backer, *The Sarbanes-Oxley Act: Federalizing Norms for Officer, Lawyer, and Accountant Behavior* 76 ST. JOHN’S L. REV. 897, 951 (2002).

<sup>14</sup> Neil A. Aronson, *Preventing Future Enrons: Implementing the Sarbanes-Oxley Act of 2002*, 8 STAN. J.L., BUS. & FIN. 127 (2002);

<sup>15</sup> Brett McDonnell, *Sarbanes-Oxley, Fiduciary Duties, and the Conduct of Officers and Directors* (University of Minnesota Legal Studies Research Paper Series, Research Paper No. 04-13, July 28, 2004), available at <http://ssrn.com/abstract=570321>.

<sup>16</sup> Lawrence E. Mitchell, *The Sarbanes-Oxley Act and the Reinvention of Corporate Governance?*, 48 VILLANOVA L. REV. 1189, 1189 (2003).

“powerful incentives for targets of criminal fraud investigations to help prosecutors build cases against other participants in the fraud.”<sup>17</sup>

Finally, some reactions were of the “much ado about nothing” variety. “[T]he Act reenacts in a new federal guise . . . existing federal regulations, state laws, stock exchange and securities industry rules, accounting or auditing practices, and corporate governance norms. These codifications do little more than shine a spotlight on some ‘best practices,’ an important function but hardly ‘reform’ of any sort, ‘sweeping’ or otherwise.”<sup>18</sup> “As a practical matter, [SOX’s provisions on obstruction of justice] criminalize very little new conduct and therefore carry very little, if any, additional deterrence benefit,” while “penalty enhancements seem unlikely to deter corporate crime to any greater degree than current provisions.”<sup>19</sup>

The debate between “pro” and “con” groups continues, fueled by the newest empirical evidence produced (mostly) in business schools. The winner, however, has failed to emerge: empirical evidence on the impact of SOX is mixed. Some studies find a variety of negative effects, while others find positive effects, no effects, or mixed effects.<sup>20</sup>

Two main problems make it difficult to conduct empirical studies of SOX and interpret their results. First, the costs and benefits of SOX are hard to quantify. For example, on the cost side, both supporters and opponents of SOX agree that the direct costs of new requirements (such as increased audit fees or management time directly devoted to the preparation of compliance documents) are only a portion of overall compliance costs. The rest -- and a major focus for critics -- are hard-to-measure costs of what one can call “defensive management” – excessive caution and bureaucratism designed to avert SOX-related litigation or investigation. Examples include redundant meetings; unnecessary requests for outside opinions from bankers, consultants, and

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<sup>17</sup> Kathleen F. Brickey, *From Enron to WorldCom and Beyond: Life and Crime After Sarbanes-Oxley*, 81 Wash. U. L. Q. 357, 360 (2003).

<sup>18</sup> Lawrence A. Cunningham, *The Sarbanes-Oxley Yawn: Heavy Rhetoric, Light Reform (And It Just Might Work)*, 35 CONN. L. REV. 915 (2003).

<sup>19</sup> Michael A. Perino, *Enron's Legislative Aftermath: Some Reflections on the Deterrence Aspects of the Sarbanes-Oxley Act of 2002*, 76 ST. JOHN'S L. REV. 671, XXX (2002).

<sup>20</sup> Part I, *infra*, discusses the rapidly growing empirical literature on SOX.

lawyers; excessive vetting of communications through inside counsel; multiplication of internal approvals, and beefing up internal procedures beyond the point that would be cost-justified. Other forms of defensive management could include restructuring a business in a way that would make it look more familiar and thus less suspicious to auditors who must vouch for the adequacy of the firm's internal controls; avoiding novel management techniques and compensation arrangements; retaining inefficient business practices because new practices call for new internal controls, which must be documented and then vetted by counsel and accountants;<sup>21</sup> moving away from flexible, decentralized, and often ad hoc decisionmaking toward slower, more bureaucratized procedures; and discouragement of entrepreneurialism and initiative.<sup>22</sup> While many commentators agree that SOX triggered some degree of defensive management, they disagree on the severity of the problem.<sup>23</sup>

At the same time, SOX's potential benefits are hard to quantify as well. SOX may create value not only by directly reducing fraud, but also by allowing corporate insiders to credibly promise not to engage in fraud in the future, which may reduce the cost of capital today. Indeed, increased investor confidence is often listed as one of the major goals of SOX by politicians,<sup>24</sup> regulators,<sup>25</sup> academics,<sup>26</sup> business leaders,<sup>27</sup> and other commentators.<sup>28</sup> And yet, measuring investor confidence is notoriously hard.

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<sup>21</sup> See Butler & Ribstein, *supra* note XXX, at 44.

<sup>22</sup> See, e.g., Peter Wallison, *If the Financial Pre-Eminence of the U.S. Is Eroding, as Several Recent Reports Contend, what's Really to Blame?*, WALL ST. J., March 20, 2007..

<sup>23</sup> See, e.g., Joel Seligman, *No One Can Serve Two Masters: Corporate and Securities Law After Enron*, 80 WASH. U.L.Q. 449, fn 173-177 and accompanying text (2002) (bureaucratization costs of SOX are modest compared to benefits), McDonnell, *supra* n.XXX (same); Michael A. Pernio, *American Reform Abroad: Sarbanes-Oxley and the Foreign Private Issuer* (SOX compliance costs are modest for foreign cross-listed companies); Carney, *supra* note XXX (costs of defensive management too high to justify benefits); Larry E. Ribstein, *Sarbanes-Oxley after Three Years* (working paper, 2005). Available at <http://ssrn.com/abstract=746884>. (same); Donald C. Langevoort, *Internal Controls After Sarbanes-Oxley: Revisiting Corporate Law's Duty of Care as Responsibility for Systems*, 31 J. CORP. L. 949 (2006) (close call).

<sup>24</sup> See See Mike Allen, *Bush Signs Corporate Reforms into Law: President Says Era of "False Profits" is Over*, WASH. POST, July 31, 2002..

<sup>25</sup> See, e.g., William H. Donaldson, Testimony concerning the Impact of the Sarbanes-Oxley Act Before the House Committee on Financial Services (April 21, 2005) ("The goals of the Sarbanes-Oxley Act are far-reaching, and aim to restore investor confidence in and assure the integrity of our markets."), available at <http://www.sec.gov/news/testimony/ts042105whd.htm>.

<sup>26</sup> See, e.g., Stephen Kwaku Asare, Lawrence A. Cunningham & Arnold Wright, *The Sarbanes-Oxley Act: Legal implications and Research Opportunities* (Boston College Law School Legal Studies Research

One common solution to estimating the hard-to-quantify costs and benefits of new legislation is to measure market reaction. If causation can be established (a big “if” that I address below), a positive stock price movement when legislative events occur signals an overall positive investor reaction. However, this approach has a variety of weaknesses. First, it measures the overall investor reaction, but does not tell us what exactly investors liked or disliked. Second, market studies indicate investor reaction to new information, not investor reaction to legislation itself. At the extreme, even if investors view new legislation negatively, markets may still move positively on legislative news if investors expected the bill to be worse than it turned out to be. Finally, if investors misjudged the long-term effects of SOX, their short-term reactions may be an unreliable guide to its actual effects.

A bigger problem for empirical studies of SOX is that we cannot reliably establish causation. There is no control group: SOX applies to *all* US public companies. Thus, even if we can quantify a post-SOX change in the behavior of U.S. firms, we cannot show a causal relationship because we cannot separate the effect of SOX from the effect of other contemporaneous events. Suppose, for example, that U.S. firms reduced their risk levels after SOX (whether they did so is not yet known). We couldn't be sure whether SOX was the cause.

This paper makes two principal contributions to our understanding of the effects of SOX. First, it provides evidence in the form that is most useful to policy makers – on specific effects of SOX (rather than overall market reactions). Second, this paper

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Series, Research Paper 122, 2007), *available at* <http://ssrn.com/abstract=947356> (“Congress passed the Sarbanes-Oxley Act to restore investor confidence.”); William W. Bratton, *Enron, Sarbanes-Oxley and Accounting: Rules Versus Principles Versus Rents*, 48 VILL. L. REV. 1023, 1023 (2003) (describing SOX as “intended to address the scandals and restore confidence in the securities markets.”); Zabihollah Rezaee & Pankaj K. Jain, *The Sarbanes-Oxley Act of 2002 and Security Market Behavior: Early Evidence* (working paper 2005), *available at* <http://ssrn.com/abstract=498083> (“To restore investor confidence and reinforce corporate accountability ... Congress passed the Sarbanes-Oxley Act.”), at p. 1.

<sup>27</sup> See, e.g., John J. Castellani, Testimony before the Senate Committee on Banking, Housing and Urban Affairs (October 23, 2003) (commenting, in a testimony called “Implementation of the Sarbanes-Oxley Act and Restoring Investor Confidence,” that “[a]ll of us – Congress, the SEC, the securities markets and the corporate community – have worked hard to restore investor confidence over the past two years, and we are proud of those efforts.”). *Available at* [http://banking.senate.gov/\\_files/castlani.pdf](http://banking.senate.gov/_files/castlani.pdf).

<sup>28</sup> See Paul Lowengrub, *The Impact Of Sarbanes Oxley On Companies, Investors, & Financial Markets*, SARBANES-OXLEY COMPLIANCE J. (Dec 6, 2005), *available at* <http://www.s-ox.com/feature/detail.cfm?articleID=1385> (“The primary goal of SOX was to help investor confidence in the public marketplace”)

examines the worldwide impact of SOX. Prior research on the effect of SOX on non-US companies has concentrated on market reactions and decisions to enter/exit the U.S. market. This paper, in contrast, provides evidence on adaptive steps that companies around the world took in response to SOX.

The primary innovation of this paper is in its research design, which allows us establish causation. As mentioned before, studies of SOX in US firms face severe causation challenges because we do not have a baseline against which we can measure firms' adoptive response. I overcome this challenge by using a natural experiment that isolates the effects of SOX. SOX applies not only to all U.S. public companies, but also to foreign firms whose stocks are traded on major U.S. exchanges – that is, firms cross-listed on levels 2 or 3 (“level-23” firms). SOX does not apply to foreign firms whose stocks are traded in the U.S. in the over-the-counter market or the "Portal" private placement market with shares available only to large institutions. These firms are said to be cross-listed on levels 1 or 4 (“level-14” firms). SOX and U.S. regulation also do not apply to foreign firms whose securities are not traded in the U.S. Thus, while the effects of SOX cannot be cleanly tested for U.S. firms, a more reliable test is available for foreign firms subject to SOX. For cross-listed firms, we have a “treatment group” (level-23 firms) -- to which the SOX "treatment" was applied. We also have two “control groups” to which this treatment was not applied --level-14 firms and non-cross-listed firms).

I match each foreign cross-listed firm to a non-cross-listed firm from the same country based on a measure of propensity to cross-list. I estimate the propensity to cross-list based on company-level characteristics, generally estimated at year-end of 2001, just before SOX was adopted: industry, market capitalization, growth rate, return on assets, leverage, and volatility of returns. I then compute, for a variety of measures of risk, the “pair risk difference” – the difference between the risk of a cross-listed firm and the risk of its non-cross-listed match. This is the first difference in my overall "triple differences" approach. I then estimate the after-SOX (mean of 2003-2005) minus before-SOX (year-end 2001) changes in the pair risk difference. This is the second difference. Other country and firm-level factors that affect firms' propensity to take risks, and the changes in this propensity over time, should be similar for a level-23 firm and its match. Thus,



the second difference provides a measure of the effect of SOX on risk-taking, net of changes due to these other factors.

Finally, I ask whether pair risk differences change differently for level-23 pairs than for level-14 pairs. This third difference controls for the possibility that the risk-taking behavior of level-23 firms changes, relative to their matches, for reasons that reflect the general exposure of level-23 firms to U.S. securities markets, rather than their exposure to SOX, because the level-14 firms are exposed to U.S. markets but not to SOX. If level-23 firms change their risk levels relative to their matches, while level-14 firms do not, this is evidence that exposure to SOX is causing – not just correlating with – the changes in risk.

I use three principal sets of proxies for risk: (1) volatility of share returns, which is a standard measure of the riskiness of shares, and thus of the riskiness of the underlying business (measured separately as unsystematic risk and total risk); (2) financial leverage (measured separately as total debt over book value of assets and total debt net of cash reserves over book value of assets; higher financial leverage implies higher risk), and (3) cash hoarding (defined separately as cash over assets and cash over equity). I find evidence, across all measures, that the pair difference in risk declined significantly after SOX for level-23 pairs and did not decline for level-14 pairs. .

I also investigate which firm-level and country-level factors predict cross-sectional differences in the changes in risk. Higher Tobin's Q firms experienced stronger reductions in risk.

I also find a complicated relationship between firm size, changes in risk levels, and the quality of the firm's domestic legal and institutional environment. Larger firms experienced stronger declines in risk levels, but only if they are located in low-GDP countries. In high-GDP countries, firm size does not predict changes in firms' risk levels. This supports the hypothesis of the differential compliance across countries. In countries with high-quality legal and institutional environments (as proxied by high GDP), all firms are expected to comply with SOX; thus, firm size is not likely to affect changes in risk levels. In contrast, in countries with low-quality legal and institutional environment, compliance is often expected only from larger, more visible, and more reputable firms.

This finding is also consistent with prior findings on the relationship between firm size, domestic institutional environment, and post-SOX changes in Tobin's Q.<sup>29</sup>

These results are robust to a variety of alternative specifications, including (1) studying firm-level instead of pair-level changes in risk measures; (2) varying the definition of the "before" and "after" SOX periods; (3) using firm fixed and firm random effects for panel regressions, and country fixed and country random effects for non-panel regressions; (4) using different control variables.

This evidence is consistent with the critics' view that SOX negatively affected corporate risk-taking, and may have particularly affected firms that were already well-governed before SOX. It is also consistent with prior research finding significant declines in market valuations of SOX-exposed foreign firms; the magnitude of the declines cannot be fully explained by increased costs of compliance.<sup>30</sup> The analysis in this paper offers a possible explanation for why investors may have reacted negatively to SOX.

Finally, some caveats and limitations. First, to create a clean experiment, I study only cross-listed companies. It is possible that U.S. firms reacted to SOX differently. However, the logic behind why SOX might have induced managers of cross-listed firms to take less risk should apply to U.S. firms as well. Moreover, preliminary evidence from a contemporaneous study of U.S. firms indicates that they too may have reduced risk levels after SOX.<sup>31</sup> Second, I find that SOX is associated with significant reduction of corporate risk, but I cannot tell whether such reduction is good or bad. It is possible that firms were too risky before SOX and have now brought their risk to the right level. Maybe "defensive management," like defensive driving, has a good side. Third, I study only risk-taking. It is possible other features of SOX had beneficial effects on firm

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<sup>29</sup> See Kate Litvak, *The Effect of the Sarbanes-Oxley Act on Non-US Companies Cross-Listed in the US*, 13 J. CORP. FIN. 195 (2007a) [hereinafter, Litvak, *SOX Event Study*].

<sup>30</sup> See Kate Litvak, *The Effect of the Sarbanes-Oxley Act on Non-US Companies Cross-Listed in the US*, 13 J. CORP. FIN. 195 (2007a) [hereinafter, Litvak, *SOX Event Study*]. See also Geoffrey P Smith, *A Look at the Impact of Sarbanes-Oxley on Cross-Listed Firms* (working paper 2007). Available at <http://ssrn.com/abstract=931051>; Xi Li, *The Sarbanes-Oxley Act and Cross Listed Foreign Private Issuers* (working paper, 2007). Available at <http://ssrn.com/abstract=952433>.

<sup>31</sup> Leonce Barger, Kenneth Lehn & Chad Zutter, *Sarbanes-Oxley and Corporate Risk-Taking* (working paper 2007), available at [http://bmlwk01.bm.ust.hk/acct/acsymp/Discussed Papers Thomas Lys/7%20Sarbanes-Oxley%20and%20Corporate%20Risk-Taking.pdf](http://bmlwk01.bm.ust.hk/acct/acsymp/Discussed%20Papers%20Thomas%20Lys/7%20Sarbanes-Oxley%20and%20Corporate%20Risk-Taking.pdf)

performance. Additional tailored, specific studies of changes in corporate behavior are needed to adequately address this possibility.

## 2. Related Research

A number of recent empirical studies papers examine the consequences of the Sarbanes-Oxley Act, measured by a variety of indicators, for both U.S. and foreign firms.

### 2.1. Studies of U.S. Firms

The results from studies of U.S. firms are mixed. On the negative side, the costs of compliance are significant. Average audit fees and premia charged by the Big Four audit firms increased significantly, especially for bigger and riskier clients.<sup>32</sup> Some companies, particularly smaller ones, responded to high auditor fees by dismissing top auditors and hiring cheaper ones.<sup>33</sup> Internal auditing costs increased.<sup>34</sup> Board of directors costs rose, especially for small firms.<sup>35</sup> It is unclear whether these extra costs improved the informativeness of accounting earnings: Cohen, Dey, and Lys find no effect, while Bédard finds a positive effect.<sup>36</sup> SOX has not altered firms' propensity to manipulate earnings through changes in their effective tax rates.<sup>37</sup>

On the positive side, measures of share liquidity, such as bid-asked spreads and depth of the available supply of shares, which worsened during the pre-SOX financial

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<sup>32</sup> See Sharad Asthana, Steven Balsam & Sungsoo Kim, *The Effect of Enron, Andersen, and Sarbanes-Oxley on the Market for Audit Services* (working paper, 2004), available at: <http://ssrn.com/abstract=560963>.

<sup>33</sup> See Michael L. Ettredge, Chan Li & Susan Scholz, *Audit Fees and Auditor Dismissals in the Sarbanes-Oxley Era* (working paper, 2007). Available at: <http://ssrn.com/abstract=929486>

<sup>34</sup> Susan W. Eldridge & Burch T. Kealey, *SOX Costs: Auditor Attestation under Section 404* (working paper, 2005). Available at: <http://ssrn.com/abstract=743285>

<sup>35</sup> James S. Linck, Jeffrey M. Netter & Tina Yang, *The Effects and Unintended Consequences of the Sarbanes-Oxley Act, and its Era, on the Supply and Demand for Directors* (working paper, 2007). Available at: <http://ssrn.com/abstract=902665>.

<sup>36</sup> Cohen, Dey & Lys (2005), *supra* note xx; Jean Bédard, *Sarbanes Oxley Internal Control Requirements and Earnings Quality* (working paper, 2006). Available at <http://ssrn.com/abstract=926271>

<sup>37</sup> Kirsten A. Cook, George Ryan Huston & Thomas C. Omer, *Earnings Management Through Effective Tax Rates: The Effects of Tax Planning Investment and the Sarbanes-Oxley Act of 2002* (working paper, 2006). Available at: <http://ssrn.com/abstract=897749>

scandals, improved after SOX, particularly for large firms.<sup>38</sup> Both firms and their auditors identified more internal control weaknesses than during the pre-SOX period.<sup>39</sup> After SOX, firms' propensity to manage earnings to meet or beat analyst expectations has declined.<sup>40</sup> Insiders are less likely to trade in the period before their firm restates its financial results.<sup>41</sup>

Findings on SOX's effect on executive compensation are mixed. On the negative side, the ratio of incentive compensation to salary declined significantly.<sup>42</sup> On the positive side, the faster reporting of option grants required by SOX appears to have reduced managerial timing of option grants.<sup>43</sup>

Findings on the market reaction of US firms are also mixed. In a much-cited paper, Zhang<sup>44</sup> finds a significant decline in US share prices during the events leading to the adoption of SOX. Others, using different methodologies and different control samples, find that share prices increased.<sup>45</sup> One study finds that firms which had to make larger changes to comply with SOX reacted more positively than other firms, while a second reports that larger, older, and faster-growing firms reacted to SOX-related

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<sup>38</sup> See Pankaj K. Jain, Jang-Chul Kim & Zabihollah Rezaee, *Trends and Determinants of Market Liquidity in the Pre- and Post-Sarbanes-Oxley Act Periods* (working paper, 2006). Available at <http://ssrn.com/abstract=488142>.

<sup>39</sup> Yan Zhang, Jian Zhou & Nan Zhou, *Audit Committee Quality, Auditor Independence, and Internal Control Weaknesses* (working paper, 2006). Available at <http://ssrn.com/abstract=925732>

<sup>40</sup> See Eli Bartov & Daniel A. Cohen, *Mechanisms to Meet/Beat Analyst Earnings Expectations in the Pre- and Post-Sarbanes-Oxley Eras* (working paper, 2006). Available at <http://ssrn.com/abstract=954857>.

<sup>41</sup> Oliver Zhen Li & Yuan Zhang, *Financial Restatement Announcements and Insider Trading* (working paper, 2006). Available at <http://ssrn.com/abstract=929539>.

<sup>42</sup> Cohen, Dey & Lys (2005), supra note xx.

<sup>43</sup> See M.P. Narayanan & Hasan Nejat Seyhun, *Effect of Sarbanes-Oxley Act on the Influencing of Executive Compensation*, (working paper, 2005), available at <http://ssrn.com/abstract=852964>; Lucian Arye Bebhuk, Yaniv Grinstein, and Urs C. Peyer, *Lucky Directors* (working paper, 2006). Available at <http://ssrn.com/abstract=952239>.

<sup>44</sup> Ivy Zhang, *Economic Consequences of the Sarbanes-Oxley Act of 2002*, J. ACCOUNTING & ECON., (forthcoming, 2008). Available at <http://ssrn.com/abstract=961964>

<sup>45</sup> See Haidan Li, Morton P.K. Pincus, and Sonja O. Rego, *Market Reaction to Events Surrounding the Sarbanes-Oxley Act of 2002 and Earnings Management* (working paper, 2006). Available at <http://ssrn.com/abstract=475163>; Rezaee and Jain, 2005), supra note xx.

information releases more negatively than other firms.<sup>46</sup> Bond values declined around the SOX-related announcements.<sup>47</sup>

Some U.S. firms have apparently responded to SOX by removing themselves from its reach. The frequency of going private has increased,<sup>48</sup> and SOX-imposed costs are cited as the primary reason for going private, especially by small firms.<sup>49</sup> The rate of “going dark,” or ceasing to report to the SEC, has increased as well.<sup>50</sup> And private companies are now more likely to sell to private acquirers.<sup>51</sup>

## 2.2. Studies of Cross-Listed Firms

A much smaller set of studies examine the effects of SOX on foreign cross-listed firms. Most find evidence of a negative investor reaction. Three event studies – including my own – estimate market reactions of investors of cross-listed firms to specific events leading to the adoption of SOX.<sup>52</sup> All three conclude that investors of foreign companies subject to SOX reacted strongly and negatively to SOX announcements, with estimated total losses of 5-10 percent of market capitalization, depending on specification.

Four additional papers, my own among them, study investors' longer term reactions to SOX by investors of foreign cross-listed companies. Three of the four

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<sup>46</sup> Compare Vidhi Chhaochharia & Yaniv Grinstein, *Corporate Governance and Firm Value - The Impact of the 2002 Governance Rules*, J. FIN. (forthcoming, 2007), with M. Babajide Wintoki, *Corporate Boards and Regulation: The Effect of the Sarbanes-Oxley Act and the Exchange Listing Requirements on Firm Value*, J. CORP. FIN. (forthcoming, 2007). Available at <http://ssrn.com/abstract=981981>.

<sup>47</sup> Mark L. DeFond, Mingyi Hung, Emre Karaoglu & Jieying Zhang, *Was the Sarbanes-Oxley Act Good News for Corporate Bondholders?* (working paper, 2007). Available at <http://ssrn.com/abstract=964865>.

<sup>48</sup> Ellen Engel, Rachel M. Hayes & Xue Wang, *The Sarbanes-Oxley Act and Firms' Going-Private Decisions* (working paper, 2004). Available at SSRN: <http://ssrn.com/abstract=546626>.

<sup>49</sup> Stanley B. Block, *The Latest Movement to Going Private: An Empirical Study*, 14 J. APPLIED FIN. 36 (2004).

<sup>50</sup> See Christian Leuz, Alexander J. Triantis & Tracy Ye Wang, 2006, *Why Do Firms Go Dark? Causes and Economic Consequences of Voluntary SEC Deregistrations* (working paper, 2004), available at <http://ssrn.com/abstract=592421>; Andras Marosi & Nadia Ziad Massoud, *Why Do Firms Go Dark?* (working paper, 2004), available at <http://ssrn.com/abstract=570421>.

<sup>51</sup> Ehud Kamar, Pinar Karaca-Mandic & Eric L. Talley, *Going-Private Decisions and the Sarbanes-Oxley Act of 2002: A Cross-Country Analysis* (working paper, 2006). Available at <http://ssrn.com/abstract=901769>.

<sup>52</sup> See Litvak, *SOX Event Study* (2007a), *supra* note xx; Li (2007), *supra* note xx; Smith (2007), *supra* note xx.

concluded that investors didn't like SOX when it was adopted, and apparently haven't changed their minds since.<sup>53</sup> One study finds that investors reacted to SOX negatively in 2002, but share prices rebounded the following year.<sup>54</sup>

U.S. firms cannot both stay public and avoid SOX. Foreign firms sometimes can – by delisting if they are already cross-listed, or by choosing to cross-list in a form that does not subject them to SOX. Delistings, which were negligible prior to SOX, have increased, and foreign companies, especially smaller and less profitable ones, are more likely to bypass US exchanges in favor of London's Alternative Investment Market.<sup>55</sup>

Of course, the fact that foreign firms now increasingly avoid US markets might mean that those firms are fleeing high-quality corporate governance, rather than fleeing high costs. Two papers, using different samples and techniques, study firms' delisting decisions and reach opposite conclusions: Hostak and coauthors<sup>56</sup> find a negative investor reaction to delisting, and infer that delisting decisions are motivated by controllers' strive to preserve rents, which would be reduced by SOX. But Li finds negative market reaction before SOX and positive reaction after SOX, concluding that firms' delisting decisions used to harm investors, but since the SOX adoption, benefit them.<sup>57</sup>

### 2.3. SOX and Risk Taking

To the best of my knowledge, there are two contemporaneous working papers which address the impact of SOX on corporate risk-taking. Both papers study US firms, suffer from inability to isolate the effect of SOX and thus cannot credibly establish

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<sup>53</sup> Litvak, *SOX and Listing Premium in 2002*, *supra* note xx (measuring investor reaction through the end of 2002); Litvak, *Long-Term Effect of SOX through 2005*, *supra* note xx (measuring investor reaction through the end of 2005); Luigi Zingales, *Is the U.S. Capital Market Losing Its Competitive Edge?* J. ECON. PERSPECTIVES (forthcoming, 2007).

<sup>54</sup> Doidge, Karolyi & Stulz (2007), *supra* note xx.

<sup>55</sup> Joseph D. Piotroski and Suraj Srinivasan, *The Sarbanes-Oxley Act and the Flow of International Listings* (working paper, 2006), available at <http://ssrn.com/abstract=956987>; Craig Doidge, G. Andrew Karolyi and Rene M. Stulz, *Has New York Become Less Competitive in Global Markets? Evaluating Foreign Listing Choices Over Time* (working paper, 2007). Available at <http://ssrn.com/abstract=982193>.

<sup>56</sup> Peter Hostak, Emre Karaoglu, Thomas Lys & Yong George Yang, *An Examination of the Impact of the Sarbanes-Oxley Act on the Attractiveness of US Capital Markets for Foreign Firms* (working paper, 2007). Available at <http://ssrn.com/abstract=956020>.

<sup>57</sup> Li (2007), *supra* note xx.

causation. Kang and Liu examine US-based firms and measure risk based on the “hurdle rate” that managers use to make investment decisions.<sup>58</sup> A higher hurdle rate imposes more severe restrictions on a firm’s ability to invest and therefore reduces its risk level. The authors find that hurdle rates increased after the adoption of SOX, particularly for more profitable, less risky, and better governed firms. Bargeron, Lehn, and Zutter<sup>59</sup> compare changes in risk levels of US and UK firms. They find that compared to UK firms, US firms significantly reduced their research-and-development and capital expenditures, increased their cash holdings, and that the probability of new cross-listings declined particularly for high-R&D firms.

In this paper, I focus on foreign rather than US firms, use a different methodology that allows me to control for contemporaneous events; and employ more measures of risk. Still, the results of all three papers are broadly consistent, which likely increases the reliability of each.

### 3. Hypothesis Development

SOX may have affected risk-taking by affected firms through several channels. Some channels predict less risk-taking, others predict more. On the risk-reduction side, there is the potential for both direct and indirect channels. One direct channel: increased penalties (both against individual managers and against the firm) for misstatements in disclosures and insufficient internal controls could dampen managers’ incentives to pursue novel or controversial strategies or invest in R&D and other hard-to-value assets. Indeed, US firms significantly reduced their investment in R&D after SOX.<sup>60</sup> Second, SOX section 304 requires the forfeiture of management’s bonuses, stock option gains, and other profits when a corporation restates its financials; this could induce firms to increase the riskless portion of executive compensation and reduce the risky portion,<sup>61</sup> and lesser incentives could lead managers to take fewer risks.

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<sup>58</sup> Qiang Kang & Quiao Liu, *The Sarbanes-Oxley Act and Managerial Risk Taking: A Structural Assessment* (working paper, 2007), available at <http://ssrn.com/abstract=967950>

<sup>59</sup> Bargeron, Lehn & Zutter (2007), *supra* note xx

<sup>60</sup> Cohen, Lys, and Day (2005), *supra* note xx.

<sup>61</sup> *Id.*



There are also potential indirect channels. One is a general bureaucratization of corporate decisionmaking brought by provisions requiring information flows between the corporation and its auditors (section 302) and attorneys (section 307), auditor review of internal controls requirements (section 404), and so forth. A second is the increased power of independent directors. This could increase the numbers of necessary approvals and intensify management's need to document its actions, leading to delays and reducing opportunities for risky, time-sensitive actions, as well as put more power in the hands of people who face litigation risk if a risky project fails, but often have limited stakes in the firm and hence little to gain if it succeeds.

On the other hand, there are also reasons to expect that SOX could *increase* risk-taking of affected firms. Outside the SOX context, John, Litov, and Yeung find that improvements in investor protection tend to increase firm riskiness.<sup>62</sup> They explain this effect by noting that managerial perks are a priority claim over equity investors; thus, higher perks align management's incentives with those of creditors. If SOX reduced opportunities for perks, we might expect increased risk-taking. Still, the dominant policy concern is that SOX may have discouraged risk-taking, it probably. I thus test:

*Hypothesis 1: After the adoption of SOX, risk levels of level-23 cross-listed firms decline, compared to risk levels of similar firms from the same countries not subject to SOX.*

I find, in my prior research on investors' near-term reaction to SOX, that more profitable and higher-disclosing foreign firms, and firms from countries with higher levels of investor protection experienced more significant declines in stock prices during events related to adoption of SOX and its applicability to foreign issuers, as well as larger declines in cross-listing premia during the year when SOX was adopted (2002).<sup>63</sup> Similar cross-sectional effects have also been found in US firms' reaction to SOX,<sup>64</sup> It is possible that part of the near-term price decline reflected investors anticipating future

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<sup>62</sup> Kose John, Lubomir P. Litov & Bernard Yin Yeung, *Corporate Governance and Managerial Risk-taking: Theory and Evidence* (working paper, 2005). Available at <http://ssrn.com/abstract=636821>.

<sup>63</sup> See Litvak, *SOX Event Study* (2007a), *supra* note xx, Litvak, *Cross-Listing Premia in 2002*, *supra* note xx.

<sup>64</sup> See Wintoki (2007), *supra* note xx, Chhaochharia & Grinstein (2007), *supra* note xx.



changes in firm behavior. If so, these firms may have experienced larger post-SOX changes in risk-taking. I therefore test:

*Hypothesis 2a: After the adoption of SOX, risk levels of level-23 firms with higher Tobin's Q decline more than risk levels of firms with lower Tobin's Q.*

*Hypothesis 2b: After the adoption of SOX, risk levels of level-23 firms from better-governed countries decline more than risk levels of level-23 firms from poorly governed countries.*

Several prior papers find that smaller firms reacted to SOX more strongly and more negatively than larger firms.<sup>65</sup> This is usually explained by the economies of scale associated with SOX compliance. I therefore test:

*Hypothesis 2c: After the adoption of SOX, risk levels of smaller level-23 firms decreased more than risk levels of larger level-23 firms.*

In prior work,<sup>66</sup> I find a complicated relationship between firm size, the quality of domestic institutional environment, and reaction to SOX. In countries with low-quality legal and institutional environments (proxied by low GDP), only larger, more visible firms are expected to comply with SOX. Thus, in low-GDP countries, larger firms should react to SOX more negatively. In high-GDP countries, all firms are expected to comply, and thus firm size does not predict its reaction to SOX.

*Hypothesis 2d: Firm size negatively predicts changes in risk levels among level-23 firms from low-GDP countries. Size does not predict changes in risk levels of firms from high-GDP countries.*

In addition, level-23 firms whose prices declined more when SOX was adopted might reduce their risk levels more than firms whose prices declined less. This could reflect either investors anticipating the effect of SOX on firm behavior, or managers responding to the SOX-induced price decline by reducing risk-taking. I therefore test:

*Hypothesis 2e: After the adoption of SOX, risk levels of level-23 firms whose prices declined more when SOX was adopted decline more than*

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<sup>65</sup> See Kamar, Karaca-Mandic & Talley (2007), *supra* note XXX; Linck, Netter & Young (2007), *supra* note XXX.

<sup>66</sup> See Litvak (2007a), *supra* note XXX

*risk levels of level-23 firms whose prices declined less when SOX was adopted.*

An alternative way to present the relationship between risk and firm value is to measure whether firms that were riskier before SOX experienced stronger declines in market value than less risky firms. I therefore test:

*Hypothesis 3: After the adoption of SOX, cross-listing premia (difference between Tobin's  $q$  of a cross-listed firm and Tobin's  $q$  of its match) of riskier firms declined more than cross-listing premia of less risky firms.*

## 4. Sample and Variables

### 4.1. Sample and Propensity Matching

To construct a sample of cross-listed companies, I begin with a list of all foreign companies cross-listed in the United States on all levels of listing (OTC = level 1, NYSE, AMEX, and NASDAQ = levels 2 and 3, and PORTAL = level 4) for the full period from 2000 through 2004. Shares of foreign companies can be traded either directly or as American Depository Receipts (ADRs) – securities issued by depository banks and representing a share of a foreign stock (or its portion or multiple). To obtain the list of ADRs, I combine the Citigroup Universal Issuance Guide with the Citigroup Capital Raising database. I then cross-check and supplement the Citigroup dataset with the list of ADRs from the Bank of New York. Information on securities traded directly on NYSE and NASDAQ is obtained from the exchanges' websites. The information on securities traded over the counter (both directly and as ADRs) is obtained from websites of Pink Sheets and the OTC Bulletin Board. For companies that had several listing types, I assign the most regulated listing level. That is, if a company is traded on NYSE (level 2) and over-the-counter (level 1), I treat it as a level 2 company.

I match the cross-listed firms onto the Datastream database, which contains share price and financial data. I keep only firms with full or partial financial data in each year from 2000-2004. I drop firms if key financial or accounting variables (size, EBITDA, sales, debt) are missing for more than two years in the row. If a firm is missing data for a particular financial variable in a particular year, I assign the median value for that country, industry, and year.

I match each cross-listed firm with a non-cross-listed firm from the same country based on propensity to cross list (the predicted values from a logit model of a firm's decision to cross-list). Let  $D_i$  be a dummy variable, which equals 1 if a firm is cross-listed on any level and zero otherwise, and let  $X_i$  be a vector of firm-level variables. For each country with one or more cross-listed firms, I construct a sample of all firms from that country with full or substantially complete financial data included in Datastream in each year from 2000-2004. I then estimate a logit model as follows:

$$\text{prob}(D_i = 1) = \alpha + \beta_i * X_i + \varepsilon_i$$

The independent variables  $X_i$  are computed as of 2001 (just before the year of SOX adoption) and include measures of firm market capitalization, industry, profitability, growth, leverage, and volatility; more specifically,  $\ln(\text{market capitalization})$ , two-digit NAICS industry code; return on assets (EBITDA/total assets); geometric average sales growth from 1999 to 2001; total debt over book value of equity; and standard deviation of daily stock returns during 2000-2004.

I then use the coefficients from the logit regression to compute the probability of cross-listing  $E(D_i)$  for each firm:

$$E(D_i) = \alpha + \beta_i * X_i$$

Within each country, I match each cross-listed firm to its "nearest neighbor" in cross-listing propensity among the non-cross-listed firms, without replacement. This creates matched pairs of companies that are as similar as possible in characteristics that predict cross-listing. In robustness checks, I obtain similar results if instead of matching on country and propensity to cross-list, I conduct a simpler match on country, industry, and then as close as possible in firm size (market capitalization).

The total number of cross-listed companies that satisfy the requirements of this study is 1,140, of which 426 are listed on levels-23 and 714 are listed on levels-14. After removing firms without sufficient financial data for 2000-2004, I am left with 940 cross-listed firms, of which 343 are level-23 and 597 are level-14. After matching them to non-cross-listed firms, I get 340 matched pairs on level-23 and 591 matched pairs for level-14. Three level-23 firms and 6 level-14 firms did not have non-cross-listed matches in their home countries.

Table 1 provides summary statistics on cross-listed firms and matching non-cross-listed firms for each country. On average, cross-listed companies are larger than their matches, although this is not the case in all countries.

## 4.2. Variables

I use the following measures of risk.

Unsystematic and total risk: total risk is measured as the standard deviation of daily returns; and unsystematic risk is the standard deviation of the abnormal returns computed from the market model, each measured separately for each year. The data availability ranges from 907 matched pairs in 2001 to 910 pairs in 2003 and 2004; 334 of these pairs are level-23. The country index is an equally weighted index of all non-cross-listed matching firms. The market model is:

$$r_{i,t} = \alpha_i + \beta_i * r_{m,t} + \varepsilon_{i,t}$$

Here  $r_{i,t}$  is the return to firm  $i$  on day  $t$ ;  $r_{m,t}$  is the return to the country index for that firm on day  $t$ ,  $\beta_i$  is a measure of the firm's systematic risk, and  $\varepsilon_{i,t}$  is the abnormal return to firm  $i$  on day  $t$ .<sup>67</sup>

Financial leverage #1 (total debt to assets): total debt divided by the book value of assets, at the end of each year.

Financial leverage #2 ((total debt minus cash), divided by book value of assets): an alternative measure of leverage.

Cash hoarding #1 (total cash to assets): total cash divided by the book value of assets, at the end of each year.

Cash hoarding #2 (total cash to equity): total cash divided by the book value of equity, at the end of each year.

I also use the following firm-level control variables. All data is from Datastream. I measure size as both  $\ln(\text{book value of assets})$  and  $\ln(\text{sales})$  at year-end 2001, in millions of U.S. dollars. Size data are available for 826 firms (322 on level-23).

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<sup>67</sup> For overviews of event study methodology, see Stephen J. Brown & Jerold B. Warner *Using Daily Stock Returns: The Case of Event Studies*, 14 J.FIN. ECON.3 (1985); A. Craig MacKinlay, *Event Studies in Economics and Finance*, 35 J. ECON. LIT.13 (1997).

I use sales growth as a proxy for growth opportunities. Sales growth is defined as the two-year geometric average of annual growth in sales. I use sales growth as a proxy for a firm's growth opportunities.

I compute Tobin's  $q$  as (market value of common shares plus book value of preferred shares plus book value of debt), divided by book value of assets. Market values are available on the monthly basis, but book values are available only annually. To compute monthly values of Tobin's  $q$ , I interpolate book values between year-end observations in equal monthly intervals.

I also use the following country-level variables, I use a cumulative measure of antidirector rights developed by Holger Spamann.<sup>68</sup> This is an expansion and reanalysis of the earlier measure developed by La Porta et al.<sup>69</sup> I also study the La Porta measures, but they are not significant and thus not reported. I also investigate the measures of countries' political economies developed by Mark Roe—budget of the financial regulator, government subsidies and transfers, and labor regulation.<sup>70</sup> These variables are not significant and thus not reported.

Gross Domestic Product per capita is from the World Bank's World Development Indicators database for 2001.

All variables are adjusted for inflation. Table 2 presents correlation coefficients for my main variables.

## 5. Methodology

My central approach is a "difference-in-differences" (DiD) methodology, in which I compare "treatment" firms (level-23 firms) to a control group of non-cross-listed firms. The underlying assumption is that if the risk characteristics of level-23 firms change relative to their matches, from before to after SOX, this difference is likely to be due to

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<sup>68</sup> See Holger Spamann, *On the Insignificance and/or Endogeneity of La Porta et al.'s 'Anti-Director Rights Index' under Consistent Coding* (working paper, 2006). Available at <http://ssrn.com/abstract=894301>

<sup>69</sup> See Rafael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, *Law and Finance*, 106 J. POL. ECON. 1113 (1998); Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer, *What Works in Securities Laws?*, 61 J. Fin., 1 (2006)

<sup>70</sup> Mark J. Roe, *Legal Origins and Modern Stock Markets*, 120 HARV. L. REV. 460 (2006).

the impact of SOX, and not to other unobserved differences between cross-listed and non-cross-listed firms. To address the risk that unobserved differences explain my results, I rely for the most part on a triple difference methodology, in which I compare the double difference between level-23 firms and their matches to the double difference between level-14 firms and their matches. This controls for both (i) unobserved differences between cross-listed firms and matching non-cross-listed firms, as long as these differences are similar for level-23 and level-14 firms; and (ii) factors common to all cross-listed firms, such as general exposure to U.S. capital markets.

Below, I generally report triple difference results, by including all pairs on all levels in the sample, and looking for an extra effect of level-23 listing. However, I obtain similar results when I limit the sample to level-23 pairs and use a double difference approach. I also generally find in unreported regressions that the risk profiles of level-14 firms did not change significantly, relative to their matches, from before to after SOX.

Within this overall approach, I address the possibility that choice of a specific methodology drives my results by using several different methodologies to estimate changes in firms' risk levels. This section summarizes my principal approaches.

### **5.1. Before-Versus-After Approach, Looking at Changes in Risk**

In the first series of tests, I calculate risk before SOX, after SOX, and compare them. For each risk measure, for each year between 2001 and 2005, I estimate the “pair difference in risk” – the difference between the risk measure of a cross-listed firm and that of its non-cross-listed match.

I treat the 2001 pair difference in risk level as the “before SOX” difference. I do not average across several pre-SOX years to avoid having the pre-SOX data affected by the NASDAQ bubble (roughly 1998 through 2000). I measure the “after SOX” difference in risk as the mean pair difference for 2003-2005. I omit 2002 (the year when SOX was adopted). I use a several-year average for the after-SOX period because it may have taken time for firms to adjust their riskiness in response to SOX. How long a lag period to use is a judgment call. Using data beyond 2005 seems too likely to capture effects that were due to causes other than SOX. In robustness checks, I obtain similar results if I define the “after SOX” period as the mean of (2003 and 2004), and, alternatively, as the mean of

(2004 and 2005). To limit the influence of outlier observations, I winsorize each before-SOX and after-SOX pair-level measure of risk at 1%/99%; I obtain similar results if I instead winsorize at 0.5%/99.5% or 2%/98%.<sup>71</sup>

I then compute the double difference in risk – the after-minus-before SOX change in the pair difference in risk. More formally, let  $c$  index countries,  $l$  index cross-listing level ( $l = 23, 14$ , or non-cross-listed match),  $i$  index cross-listed companies (for convenience, let  $i$  cumulate across all firms in all countries),  $t$  index time (after or before), and  $R_{c,l,i,t}$  be the risk level (on a particular measure) of company  $i$ , from country  $c$ , on cross-listing level  $l$ , at time  $t$ . The double difference in risk level is:

$$DDR_{c,l,i} = (R_{c,23or14,i,after} - R_{c,match,i,after}) - (R_{c,23or14,i,before} - R_{c,match,i,before})$$

I estimate the following base models:

Double difference model, with the sample limited to level-23 pairs. The coefficient of interest is the constant term  $\alpha$ .

$$DDR_{c,l,i} = \alpha + \sum_j (\beta_j * X_j) + \mu * I_{mp14} + \varepsilon_{c,l,i}$$

Here  $X_j$  is a vector of firm and country characteristics, indexed by  $j$ , and  $Imp14$  is the country median of the double difference in risk for level-14 pairs., which controls for country-level changes in the differences in risk measures between level-14 firms and their matches.

Triple difference model, with the sample including all pairs.

$$DDR_{c,l,i} = \alpha + \theta * dum_{23} + \sum_j (\beta_j * X_j) + \mu * I_{mp14} + \varepsilon_{c,l,i}$$

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<sup>71</sup> “Winsorizing” is a statistical procedure that replaces specified parts of the sample (here, highest and lowest 0.5%, 1%, or 2%) with the most extreme remaining values.

Here  $dum_{23}$  is a dummy variable which equals 1 for level-23 pairs, and 0 for level-14 pairs. The coefficient of interest is  $\theta$ , a negative coefficient indicate that the risk level of level-23 cross-listed firms declined relative to their matches, and relative to any decline in level-14 pairs. This can be understood as a triple difference estimate (difference of double differences, between level-23 pairs and level-14 pairs).

I also run cross-sectional regressions, to assess which firm-level and country-level characteristics predict a change in risk for level-23 firms:

$$DDR_{c,l,i} = \alpha + \theta * dum_{23} + \sum_j (\beta_j * X_j) + \mu * I_{mp14} + \sum_j (\omega_j * dum_{23} * X_j) + \varepsilon_{c,l,i}$$

The coefficients  $\theta_j$  on the interaction terms give the predicted effect of the firm-level or country-level variable on the triple difference in after-minus-before risk between level-23 pairs and level-14 pairs.

All regressions include country random effects to control for otherwise uncaptured country-level characteristics that influence risk. I cannot use firm fixed effects because I only have one observation per firm (double difference: after minus before SOX difference in pair risk). In robustness checks, I also use country fixed effects, with similar results (not reported). I present random effects specifications because this allows me to report coefficients on country-level variables, which are dropped with country fixed effects.

## 5.2. Panel Data with “After-SOX” Dummy, Looking at Changes in Risk



In the alternative approach, I use panel data of all matched pairs from 1998 through the end of 2005. The dependent variable is the pair difference in each measure of risk  $X$  – the difference between the value of  $X$  of a cross-listed firm and its non-cross-listed match. I then run a firm fixed effects regressions with monthly dummies. The coefficient of interest is that on the interaction term between the after-SOX dummy and the dummy for the level-23 listing (the one that subjects a foreign firm to SOX).

### **5.3. Panel Data, Looking at Changes in Firm Value**

As a final check, I ask whether riskier firms suffered larger losses (or experienced stronger gains) after the SOX adoption. This model is the same as in section 5.3, except it uses monthly change in pair-level Tobin's  $q$  as a dependent variable, and the coefficient of interest is that on the interaction between dummy for the level-23 listing and pre-SOX volatility of returns (measure of risk).

## **6. Results**

### **6.1. Main results: Post-SOX Changes in Volatility of Returns. Three Specifications – Panel with Matched Pairs; Panel with Individual Firms; and Non-Panel with Matched Pairs**

Table 3 presents my main results for changes in volatility of returns. This is a monthly panel of volatility of returns. The dependent variables are pair's unsystematic risk (columns 1 and 2) and total risk (columns 3 and 4). Pair's risk is defined as the difference between the risk of a cross-listed company and the risk of its non-cross-listed matching company (same country, similar propensity to cross-list based on size, industry, and profitability). The coefficients of interest are those on the interaction variables "exchange \* after SOX" (for all level-23 firms); "NYSE \* after SOX," and "NASDAQ \* After SOX" (for foreign firms traded on NYSE and NASDAQ, separately). The regression uses pair fixed effects, month fixed effects, and pair clusters. The results are similar if I use pair random effects or country fixed effects instead of firm fixed effects (not reported).

The results are consistent across all specifications. The coefficients on "exchange \* after SOX" interaction are significant and negative, as are the coefficients on

interactions between individual exchanges and the after-SOX dummy. These results indicate wide across-the-board declines in volatility after SOX. Matched pairs where cross-listed firms are subject to SOX reduced their risk levels more than matched pairs where cross-listed firms are not subject to SOX. This is consistent with something in the firm's exposure to SOX, rather than the mere fact of cross-listing, spurring the post-SOX reduction in risk.

Table 3 tells us that level-23 *pairs* reduced risk more than level-14 pairs. The use of matched-pairs methodology always raises a question of whether the results are robust to non-pairs specifications. In Table 4, I address this concern. Instead of using pair-based measures of risk, I use measures of risk of individual firms. Here, all firms (cross-listed and non-cross-listed) are used as individual firms, rather than components of a matched pair. The dependent variables here are unsystematic (columns 1 through 4) and total risk (columns 5 through 8) of each firm. The coefficients of interest are those on the interactions "exchange \* after SOX" (for all level-23 firms), "NYSE \* after SOX" (for foreign firms traded on NYSE), and "NASDAQ \* after SOX" (for NASDAQ-traded foreign firms). The omitted category is non-cross-listed firms. As in Table 3, I use firm fixed effects, month fixed effects, and firm clusters.

The results are again strong, consistent across different specifications, and consistent with the results from the matched pairs approach in Table 3. Exchange-traded foreign firms experienced significant declines in volatility levels after SOX, as compared to foreign firms listed on OTC or PORTAL, and as compared to foreign firms not listed in the US. These results are robust to the use of different regression specifications.

In Table 5, I turn to the non-panel approach. One benefit of the non-panel approach is that it avoids the use of bubble-period data (late 90s), which may affect the results. The downside is that we lose valuable information by concentrating on only few years. In Table 5, I compare pair-level unsystematic (total) risk in the year immediately before SOX (2001) with the mean unsystematic (total) risk of the years immediately following SOX (2003, 2004, and 2005). In robustness checks, I use only the year of 2003, with similar results (not reported).

The coefficient of interest here is that on the "exchange" variable (dummy for level-23 listing). The results are consistent with those presented in Tables 3 and 4:

foreign firms subject to SOX significantly reduced their risk levels, as compared to foreign cross-listed firms not subject to SOX and otherwise similar foreign non-cross-listed firms.

## **6.2. Alternative Measures of Risk: Financial Leverage and Cash Hording**

In Tables 6 through 8, I turn to alternative measures of risk. These measures are less reliable because first, they are based on annual, rather than monthly, data; and second, they are based on company self-reporting, rather than easily verifiable measures like stock price returns. Annual financial reports are often suspect, especially for foreign companies that are not subject to the US regulation, or for foreign companies that report using different standards. Nevertheless, the results here are similar to the results of volatility-based measures.

Table 6 is a panel regression that uses annual measures of pair's leverage – debt over assets and (debt minus cash) over assets. Pair's leverage is the difference between the leverage of a cross-listed company and the leverage of its non-cross-listed match. The coefficients of interest here are those on the interaction “exchange \* after SOX”. As in Table 3, this regression uses firm fixed effects and clusters, and year fixed effects (because, unlike measures of volatility, measures of leverage are annual, not monthly).

The results are consistent with those reported in Tables 3 through 5. Exchange-traded (SOX-exposed) foreign firms reduced their leverage after SOX; the results are significant at the 10% level.

In Table 7, I use the non-panel “after-minus-before” approach to measure changes in leverage. Here, the dependent variable is the triple difference – the difference between the change in leverage of a cross-listed firm (after-SOX minus before-SOX leverage) and the analogous change in leverage of a non-cross-listed match. As in Table 5, the pre-SOX period is defined as the year-end of 2001, and the after-SOX period, as the mean of 2003, 2004, and 2005. The coefficients of interest here are those on the “exchange” variable. These regressions, like those reported in Table 5, use country fixed effects; robust standard errors are reported. The results are consistent with those reported in prior tables:

foreign firms subject to SOX experienced significant declines in leverage, as compared to foreign cross-listed firms not subject to SOX and foreign non-cross-listed firms.

In Table 8, I ask whether SOX-exposed firms changed their cash-hording practices. The specification here is similar to that used in Table 4 (individual company approach, rather than matched-pairs approach). The use of matched-pairs regressions produces much weaker results for this dependent variable (not reported).

In Table 8, the dependent variables are individual firms' measures of cash-over-assets and cash-over equity. This is a panel regression. The omitted category is non-cross-listed firms. The coefficients of interest are those on the interaction variables "exchange \* after SOX."

The results are consistent with findings in Tables 3 through 7. SOX-exposed foreign firms increased their cash hording, as compared to foreign firms not listed in the US and foreign firms listed in the US, but not subject to SOX. Increased hording of cash indicates reduction in risk levels.

### **6.3. Relationship Between Pre-SOX Risk Levels and Changes in Firm Valuation**

In Table 9, I ask a related question. If SOX penalized risk-taking, then, firms that were riskier before SOX should suffer larger declines in market values than their less risky counterparts. In Table 9, the dependent variable is the pair's Tobin's  $q$  (Tobin's  $q$  of a cross-listed company minus Tobin's  $q$  of its non-cross-listed match), calculated annually between 1995 and 2005. The coefficient of interest is that on the triple interaction term "Exchange \* After SOX \* Unsystematic Risk"; it tells us whether the level of a firm's pre-SOX unsystematic risk predicts changes in its Tobin's  $q$  after SOX.

The results here are consistent with finding in prior tables. The coefficient on the triple interaction of interest are negative and significant. The results are robust to different specifications and the use of different control variables. Riskier foreign firms subject to SOX experienced greater declines in value after the adoption of SOX, both compared to their matches and compared to cross-listed firms not subject to SOX.

#### 6.4. Factors Predicting Risk Changes

In Table 10, I ask which factors predict after-SOX changes in firms' volatility. Both Panel A and Panel B present the results of non-panel “after-minus-before” regressions, comparing before and after-SOX levels of risk. I use non-panel specification here because in the panel version, these regressions would have required the simultaneous use of multiple triple interactions for all variables of interest, and it is difficult to interpret the meaning of such variables. In Panel A, the coefficients of interest are those on the interactions between “Exchange” dummy and each firm-level or country-level characteristic. Tobin’s Q and firm size emerge as significant negative predictors of changes in risk levels.

In Panel B, I ask whether my data support the complicated “compliance” hypothesis – the hypothesis that looks at the triple interaction between firm size, the quality of the domestic legal environment, and the reaction to SOX. In Column 1, I limit the sample to pairs from high-GDP countries (above-median GDP). The coefficient on the interaction “exchange \* lnAssets” is not significant, indicating that firm size does not predict changes in risk-taking in high-GDP countries. In Column 2, I limit the sample to pairs from low-GDP countries. Here, the coefficient on the interaction “exchange \* lnAssets” is strongly negative. In Column 3, I include all firms; here, the coefficient of interest is that on the triple interaction “exchange \* lnAssets \* highGDP”. This coefficient is strong and positive, indicating that the difference between high- and low-GDP countries that we observe in Columns 1 and 2 is itself statistically significant.

In other words, I find support for the “compliance” hypothesis. Firm size is a strong negative predictor of changes in risk levels in low-GDP countries, but not in high-GDP countries.

### 7. Conclusions

This paper addresses two important and related questions. First, did the Sarbanes-Oxley Act encouraged corporations to reduce risk? Second, did the Sarbanes-Oxley Act have an effect on foreign cross-listed companies? The answers is yes to both – risk levels of foreign cross-listed companies declined after SOX, controlling for multiple firm- and country-level characteristics.

The conclusions about the changes in risk somewhat depend on the measure of risk that one adopts. The usual market-based measures (volatility of returns) produce strong results in all specifications. The results for some annually-reported measures (leverage) are likewise strong and consistent across specifications. The results for other annually-reported measures (cash hoarding) are strong for some specifications, but not others.

Among questions remaining for future research are the causes of the differences between changes in different measures of risk. Perhaps the finding that volatility-based risk measures declined strongly across the board, but leverage-based risk measures declined only for high-growth firms is more than a result of measurement differences. It is possible that SOX affected different ways in which corporations can reduce their risks differently, and future research may be able to tease out the differences in more detail. It is also possible, of course, that self-reported measures are less reliable, especially when coming from non-cross-listed companies located in poorly-governed countries.

**Table 1: Summary Statistics**

| Country      | Cross-Listed Companies, All Levels | Matched Pairs, All Levels | Level-23, Matched Pairs | Median Market Cap of All Cross-Listed Companies, \$M | Median Market Cap of Cross-Listed Companies that Had Matches, \$M |
|--------------|------------------------------------|---------------------------|-------------------------|--|---|
| ARG          | 17                                 | 11                        | 8                       | 260.98   | 408.78  |
| AUS          | 33                                 | 22                        | 0                       | 36.54  | 49.06   |
| BEL          | 3                                  |                           |                         | 5646.71  |   |
| BRA          | 52                                 | 19                        | 14                      | 682.37   | 502.52  |
| CAN          | 64                                 | 29                        | 26                      | 1604.18  | 532.62  |
| CHL          | 13                                 | 3                         | 3                       | 2122.66  | 2122.66   |
| CHN          | 23                                 | 8                         | 5                       | 391.95   | 735.87  |
| CZE          | 1                                  | 1                         | 0                       | 4699.93  | 4699.93   |
| DMK          | 3                                  | 3                         | 2                       | 15366.05   | 15366.05  |
| EGP          | 4                                  | 3                         | 0                       | 1009.22  | 1079.28   |
| FIN          | 8                                  | 7                         | 4                       | 2235.72  | 2402.41   |
| FRA          | 40                                 | 37                        | 24                      | 6259.77  | 6690.18   |
| GER          | 37                                 | 36                        | 18                      | 7675.84  | 7675.84   |
| GRE          | 7                                  | 7                         | 2                       | 6027.70  | 6027.70   |
| HGY          | 10                                 | 10                        | 1                       | 773.56   | 773.56  |
| HK           | 90                                 | 86                        | 9                       | 680.27   | 691.81  |
| IDN          | 4                                  | 4                         | 2                       | 1647.02  | 1647.02   |
| IND          | 50                                 | 45                        | 8                       | 642.80   | 707.86  |
| IRE          | 2                                  |                           |                         | 844.99   |   |
| ISR          | 12                                 | 11                        | 10                      | 493.72   | 563.19  |
| ITL          | 21                                 | 20                        | 9                       | 3394.30  | 4486.86   |
| JPN          | 123                                | 115                       | 24                      | 4848.32  | 4848.32   |
| KOR          | 27                                 | 23                        | 6                       | 4798.79  | 4765.57   |
| LUX          | 1                                  | 1                         | 1                       | 1262.48  | 1262.48   |
| MAL          | 12                                 | 12                        | 0                       | 213.69   | 213.69  |
| NOR          | 15                                 | 15                        | 6                       | 1330.85  | 1330.85   |
| NTH          | 31                                 | 27                        | 18                      | 2782.65  | 5162.73   |
| NWZ          | 5                                  | 5                         | 3                       | 1160.55  | 1160.55   |
| PAK          | 3                                  | 3                         | 0                       | 512.82   | 512.82  |
| PER          | 5                                  | 5                         | 2                       | 556.15   | 556.15  |
| PLP          | 13                                 | 12                        | 0                       | 453.56   | 430.55  |
| POL          | 9                                  | 8                         | 1                       | 826.12   | 637.52  |
| POR          | 7                                  | 7                         | 3                       | 3723.65  | 3723.65   |
| RUS          | 29                                 | 12                        | 3                       | 693.00   | 2261.42   |
| SAF          | 58                                 | 47                        | 12                      | 225.17   | 357.01  |
| SLO          | 1                                  |                           |                         | 1500.80  |   |
| SNG          | 32                                 | 29                        | 4                       | 1369.30  | 1416.59   |
| SPN          | 11                                 | 11                        | 7                       | 24113.00   | 24113.00  |
| SRI          | 1                                  |                           |                         | 528.74   |   |
| SWE          | 36                                 | 35                        | 21                      | 1475.41  | 1369.89   |
| SWZ          | 24                                 | 23                        | 18                      | 7995.45  | 7468.40   |
| TAI          | 37                                 | 37                        | 6                       | 1448.64  | 1448.64   |
| THL          | 22                                 | 16                        | 0                       | 408.82   | 524.31  |
| TKY          | 25                                 | 19                        | 2                       | 252.19   | 464.12  |
| UK           | 99                                 | 93                        | 55                      | 5200.44  | 5498.15   |
| VEN          | 20                                 | 14                        | 3                       | 95.94  | 208.82  |
| <b>Total</b> | <b>1140</b>                        | <b>931</b>                | <b>340</b>              | <b>1586.57</b>                                       | <b>1909.00</b>  |

## Table 2: Correlation Coefficients

Pearson correlation coefficients for the principal variables used in this paper.

|                       | Ln<br>Assets | Sales<br>Growth | Tobin's<br>Q | Total<br>Debt | Debt No<br>Cash | St Dev<br>Returns | Unsystem<br>Risk | Systemat<br>Risk | Ln GDP/<br>Capita |
|-----------------------|--------------|-----------------|--------------|---------------|-----------------|-------------------|------------------|------------------|-------------------|
| <b>Ln Assets</b>      | 1            |                 |              |               |                 |                   |                  |                  |                   |
| <b>Sales Growth</b>   | -0.0551      | 1               |              |               |                 |                   |                  |                  |                   |
| <b>Tobin's Q</b>      | -0.2331      | 0.0646          | 1            |               |                 |                   |                  |                  |                   |
| <b>Total Debt</b>     | 0.0411       | 0.0605          | -0.0678      | 1             |                 |                   |                  |                  |                   |
| <b>Debt no Cash</b>   | 0.0652       | 0.05            | -0.0947      | 0.9952        | 1               |                   |                  |                  |                   |
| <b>St Dev Returns</b> | -0.2886      | 0.0625          | 0.017        | 0.0277        | 0.0176          | 1                 |                  |                  |                   |
| <b>Unsystem Risk</b>  | 0.0589       | 0.0668          | 0.0792       | 0.0196        | 0.0099          | 0.35              | 1                |                  |                   |
| <b>Systemat Risk</b>  | -0.0392      | 0.064           | 0.0787       | 0.0107        | 0.0044          | 0.1522            | 0.3604           | 1                |                   |
| <b>Ln GDP/ Capita</b> | 0.0234       | -0.0392         | 0.036        | -0.0247       | -0.0361         | -0.1912           | -0.1773          | -0.0568          | 1                 |



**Table 3: Matched Pairs; Monthly Panel Regressions**

Results from the monthly panel regressions (1995-2005) Dependent variables are: pair's unsystematic risk (columns 1 and 2) and total risk (columns 3 and 4). Pair's risk is the difference between the risk of a cross-listed company and the risk of its non-cross-listed matching company (same country, similar propensity to cross-list based on size, industry, and profitability). The coefficients of interest are those on the interaction variables "exchange \* after SOX" (for all level-23 firms); "NYSE \* after SOX," and "NASDAQ \* After SOX."

|                                     | Unsystematic Risk<br>Matched Pairs |                  | Total Risk<br>Matched Pairs |                  |
|-------------------------------------|------------------------------------|------------------|-----------------------------|------------------|
|                                     | 1                                  | 2                | 3                           | 4                |
| Exchange *                          | <b>-0.004</b>                      |                  | <b>-0.004</b>               |                  |
| After SOX                           | <b>(3.09)***</b>                   |                  | <b>(3.46)***</b>            |                  |
| NYSE *                              |                                    | <b>-0.003</b>    |                             | <b>-0.003</b>    |
| After SOX                           |                                    | <b>(1.97)**</b>  |                             | <b>(2.28)**</b>  |
| NASDAQ *                            |                                    | <b>-0.005</b>    |                             | <b>-0.006</b>    |
| After SOX                           |                                    | <b>(3.40)***</b> |                             | <b>(3.63)***</b> |
| NYSE                                |                                    | 0.000            |                             | 0.001            |
|                                     |                                    | (0.42)           |                             | (0.70)           |
| NASDAQ                              |                                    | 0.003            |                             | 0.006            |
|                                     |                                    | (1.46)           |                             | (2.45)**         |
| Exchange                            | 0.001                              |                  | 0.002                       |                  |
|                                     | (1.18)                             |                  | (1.77)*                     |                  |
| After SOX                           | 0.002                              | 0.002            | 0.005                       | 0                |
|                                     | (1.48)                             | (1.50)           | (2.80)***                   | (0.15)           |
| Ln Assets                           | -0.002                             | -0.002           | -0.002                      | -0.002           |
|                                     | (2.77)***                          | (2.67)***        | (2.47)**                    | (2.31)**         |
| Sales Growth                        | 0                                  | 0                | 0                           | 0                |
|                                     | (0.93)                             | (0.95)           | (1.03)                      | (1.05)           |
| Change in Pair<br>Tobin's Q in 2002 | 0.001                              | 0.001            | 0.001                       | 0.001            |
|                                     | (1.76)*                            | (1.73)*          | (1.68)*                     | (1.63)           |
| Pair Tobin's Q                      | 0.001                              | 0.001            | 0.002                       | 0.001            |
|                                     | (0.83)                             | (0.80)           | (1.07)                      | (1.03)           |
| Constant                            | -0.004                             | -0.004           | -0.007                      | -0.004           |
|                                     | (1.51)                             | (1.51)           | (1.86)*                     | (1.16)           |
| Pair FE, Month FE;<br>Pair Clusters | Yes                                | Yes              | Yes                         | Yes              |
| Observations                        | 42817                              | 42817            | 42764                       | 42764            |
| Firms                               | 845                                | 845              | 845                         | 845              |



**Table 5: Matched Pairs;  
Before-and-After, Non-Panel Regressions**

Results from cross-sectional regressions. Dependent variables are: pair's after-minus-before SOX unsystematic risk (column 1) and pair's after-minus-before SOX total risk (column 2). The "before" period is the year-end of 2001. The "after" period is the mean of year-ends of 2003, 2004, and 2005. Each match pairs consists of a cross-listed company and a non-cross-listed matching firm from the same countries as cross-listed firms, with the propensity to cross-list (based on size, industry, and profitability). The coefficient of interest is that on the "exchange" variable (dummy for level-23 listing)

|                                     | Unsystematic<br>Risk<br>Matched Pairs<br>1 | Total Risk<br>Matched Pairs<br>2 |
|-------------------------------------|--|----------------------------------|
| Exchange                            | <b>-0.004</b><br><b>(2.12)**</b>           | <b>-0.004</b><br><b>(1.67)*</b>  |
| Sales Growth                        | -0.002<br>(1.29)                           | -0.002<br>(1.38)                 |
| Change in Pair<br>Tobin's Q in 2002 | 0.002<br>(1.30)                            | 0.002<br>(1.34)                  |
| Pair Tobin's Q                      | 0<br>(0.36)                                | 0<br>(0.03)                      |
| Ln Assets                           | 0<br>(0.09)                                | -0.001<br>(0.76)                 |
| Constant                            | 0<br>(0.18)                                | -0.001<br>(1.15)                 |
| Country FE                          | Yes  | Yes                              |
| Firms                               | 772  | 769                              |
| Countries                           | 42   | 42                               |
| R-squared                           | 0.02                                       | 0.01                             |

**Table 6: Other Measures of Risk – Leverage  
Matched Pairs; Annual Panel Regressions**

Results from the annual panel regressions (1995-2005). Dependent variables are: pair's leverage: debt/assets and pair's (debt-cash)/assets. Pair's leverage is the difference between the leverage of a cross-listed company and leverage of a non-cross-listed matching company (from the same country, with similar propensity to cross-list based on size, industry, and profitability). The coefficients of interest are those on the interaction variable "exchange \* after SOX."

|                                     | Debt/Assts     | (Debt-<br>Cash)/Asst |
|-------------------------------------|----------------|----------------------|
| Exchange *                          | <b>-0.277</b>  | <b>-0.341</b>        |
| After SOX                           | <b>(1.75)*</b> | <b>(1.95)*</b>       |
| Exchange                            | 0.12           | 0.118                |
|                                     | (1.23)         | (1.01)               |
| After SOX                           | 0.107          | 0.188                |
|                                     | (1.89)*        | (1.57)               |
| Ln Assets                           | 0.059          | 0.073                |
|                                     | (1.82)*        | (2.19)**             |
| Sales Growth                        | -0.005         | 0.003                |
|                                     | (0.14)         | (0.10)               |
| Change in Pair<br>Tobin's Q in 2002 | 0.045          | 0.047                |
|                                     | (1.43)         | (0.86)               |
| Pair Tobin's Q                      | 0.269          | 0.273                |
|                                     | (1.05)         | (0.95)               |
| Constant                            | 0.177          | 0.198                |
|                                     | (1.14)         | (1.29)               |
| Year FE; Firm FE;<br>Firm Clusters  | Yes            | Yes                  |
| Observations                        | 3611           | 3594                 |
| Firms                               | 846            | 843                  |

**Table 7: Other Measures of Risk – Leverage  
Matched Pairs; Non-Panel Regressions**

Results from the cross-sectional regressions. The dependent variable is triple difference – the difference between the change in leverage of a cross-listed company (after SOX minus before SOX) and the change in leverage of a non-cross-listed matching company. “Before” SOX is the year-end of 2001; after SOX is the mean of 2003, 2004, 2005. Non-cross-listed matching company is selected from the same country, with similar propensity to cross-list based on size, industry, and profitability. The coefficients of interest are those on the “exchange” variable (all pairs with level-23 firms).

|                   | Debt/Assts       | (Debt-<br>Cash)/Asst |
|-------------------|------------------|----------------------|
|                   | <b>-9.623</b>    | <b>-9.721</b>        |
| Exchange          | <b>(3.25)***</b> | <b>(3.26)***</b>     |
|                   | 8.546            | 8.544                |
| Ln Assets         | <b>(4.13)***</b> | <b>(4.10)***</b>     |
|                   | 0.59             | 0.526                |
| Sales Growth      | (0.67)           | (0.60)               |
| Change in Pair    | 1.333            | 1.272                |
| Tobin's Q in 2002 | (0.56)           | (0.53)               |
|                   | -0.683           | -0.676               |
| Pair Tobin's Q    | (0.26)           | (0.26)               |
|                   | 10.823           | 10.845               |
| Constant          | <b>(5.51)***</b> | <b>(5.50)***</b>     |
| Country FE        | Yes              | Yes                  |
| Firms             | 716              | 710                  |
| Countries         | 42               | 42                   |
| R-squared         | 0.06             | 0.06                 |

**Table 8: Other Measures of Risk – Cash Hording  
Individual Firms; Annual Panel Regressions**

Results from the annual panel regressions (1995-2005). Dependent variables are: individual firm values of cash-to-assets (column 1) and cash-to-equity (column 2). Omitted category is non-cross-listed firms, selected from the same countries as cross-listed firms, based on the propensity to cross-list (size, industry, and profitability). The coefficients of interest are those on the interaction variable “exchange \* after SOX.”

|  | Cash-<br>to-<br>Assets        | Cash-<br>to-<br>Equity           |
|--|-------------------------------|----------------------------------|
| Exchange * After SOX                           | <b>0.01</b><br><b>(1.76)*</b> | <b>0.071</b><br><b>(2.60)***</b> |
| Exchange Traded Firms                          | 0.046<br>(4.77)***            | -0.061<br>(1.47)                 |
| OTC Traded Firms                               | 0.003<br>(0.44)               | -0.09<br>(2.91)***               |
| PORTAL Traded Firms                            | 0.021<br>(2.33)**             | -0.083<br>(1.50)                 |
| After SOX                                      | -0.016<br>(2.63)***           | -0.129<br>(3.62)***              |
| Ln Assets                                      | -0.039<br>(8.86)***           | 0.082<br>(4.21)***               |
| Sales Growth                                   | -0.001<br>(0.79)              | 0<br>(0.06)                      |
| Tobin's Q                                      | 0.01<br>(4.66)***             | 0.006<br>-0.92                   |
| Change in Tobin's Q in<br>2002                 | -0.017<br>(4.01)***           | -0.037<br>(3.83)***              |
| Constant                                       | 0.059<br>(3.65)***            | 0.508<br>(4.66)***               |
| Year FE; Country FE;<br>Firm RE; Firm Clusters | Yes                           | Yes                              |
| Observations                                   | 6710                          | 6710                             |
| Firms  | 1494                          | 1494                             |

**Table 9: Annual Cross-Listing Premia  
Matched Pairs; Annual Panel Regressions**

Results from panel data regressions estimating changes in cross-listing premia (pair Tobin's q). The dependent variable is the pair Tobin's q (Tobin's q of a cross-listed company minus Tobin's q of its non-cross-listed match), calculated annually between 1995 and 2005, winsorized at 1%/99%. Non-cross-listed matching company is from the same country and has the closest available propensity to cross-list based on industry, asset size, return on assets, sales growth, and leverage. Independent variables include a dummy for level-23 (exchange) cross-listing; after-SOX dummy (starting with year-end of 2002); sales growth, firm size (ln of sales), unsystematic risk, ln GDP per capita, S&P country-level measure of disclosure. The coefficients of interest are those on the triple interactions (exchange\*aftersox\*company/country characteristic). All non-dummy independent variables are normalized. All regressions use country and year firm fixed effects, firm random effects and firm clusters. *T*-statistics are reported under regression coefficients. Symbols \*, \*\*, \*\*\* indicate significance at 10%, 5%, and 1% levels. Significant results (at 10% level or better) are in **boldface** for variables of interest (unsystematic risk interacted with exchange dummy and after-SOX dummy).

|   | 1               | 2               | 3               |
|---|-----------------|-----------------|-----------------|
| Exchange * After SOX *                      | <b>-0.463</b>   | <b>-0.476</b>   | <b>-0.627</b>   |
| Unsystematic Risk                           | <b>(2.01)**</b> | <b>(2.04)**</b> | <b>(2.51)**</b> |
| Exchange * After SOX *                      | -0.016          | -0.011          | -0.052          |
| Firm Size (Ln Sales)                        | -0.12           | -0.08           | -0.35           |
| Exchange * After SOX *                      | -0.037          | -0.039          | -0.071          |
| Ln GDP                                      | -0.33           | -0.35           | -0.46           |
| Exchange * After SOX *                      |                 | 0.014           | -0.111          |
| Sales Growth                                |                 | -0.11           | -1.47           |
| Exchange * After SOX *                      |                 |                 | 8.572           |
| ROA   |                 |                 | (1.93)*         |
| Exchange * After SOX *                      |                 |                 | 0.102           |
| Disclosure S&P                              |                 |                 | -0.61           |
| Exchange * After SOX                        | -0.185          | -0.205          | -0.428          |
|   | -1.24           | -1.38           | (2.55)**        |
| Exchange                                    | 0.622           | 0.622           | 0.6             |
|   | (3.71)***       | (3.69)***       | (3.12)***       |
| After SOX                                   | -0.019          | 0.028           | 0.026           |
|   | -0.2            | -0.36           | -0.32           |
| Unsystematic Risk                           | 0.007           | 0.008           | -0.016          |
|   | -0.12           | -0.14           | -0.3            |
| Firm Size (Ln Sale)                         | -0.02           | -0.025          | -0.057          |
|   | -0.3            | -0.37           | -0.72           |
| Sales Growth                                | -0.027          | -0.047          | -0.073          |
|   | -0.95           | -1.41           | (1.90)*         |
| Global Industry                             | 0.29            | 0.291           | 0.31            |
| Tobin's Q                                   | (5.29)***       | (5.31)***       | (5.38)***       |
| ROA   |                 |                 | 0.297           |
|   |                 |                 | -0.2            |
| Constant                                    | -0.295          | -0.348          | -0.013          |
|   | -1.3            | -1.56           | -0.03           |
| Corresponding Double Interactions           | Yes             | Yes             | Yes             |
| Year FE; Country FE; Firm RE; Firm Clusters | Yes             | Yes             | Yes             |
| Observations                                | 3419            | 3419            | 2886            |
| Firms                                       | 801             | 801             | 652             |

**Table 10: Predictors of Changes in Risk Levels  
Matched Pairs; Before-and-After; Non-Panel Regressions**

**Panel A:** Results from non-panel cross-sectional regressions. Dependent variables are: pair's after-minus-before SOX unsystematic risk (column 1) and pair's after-minus-before SOX total risk (column 2). The "before" period is the year-end of 2001. The "after" period is the mean of year-ends of 2003, 2004, and 2005. Each match pairs consists of a cross-listed company and a non-cross-listed matching firm from the same countries as cross-listed firms, with the propensity to cross-list (based on size, industry, and profitability). The coefficient of interest is that on the "exchange" variable (dummy for level-23 listing).

|  | Unsystematic<br>Risk<br>Matched<br>Pairs | Total Risk<br>Matched<br>Pairs   |
|--|--|----------------------------------|
| Exchange * Pair Tobin's Q                      | <b>-0.005</b><br><b>(2.14)**</b>         | <b>-0.005</b><br><b>(2.01)**</b> |
| Exchange * Ln Assets                           | <b>-0.007</b><br><b>(2.53)**</b>         | <b>-0.006</b><br><b>(2.09)**</b> |
| Exchange * Sales Grow                          | 0<br>(0.19)                              | 0.001<br>(0.26)                  |
| Exchange * Change in Pair<br>Tobin's Q in 2002 | 0<br>(0.13)                              | 0<br>(0.13)                      |
| Exchange * Ln GDP                              | 0.003<br>(1.10)                          | 0.001<br>(0.47)                  |
| Exchange                                       | -0.004<br>(2.09)**                       | -0.003<br>(1.36)                 |
| Sales Growth                                   | -0.002<br>(1.02)                         | -0.003<br>(1.12)                 |
| Change in Pair<br>Tobin's Q in 2002            | 0.003<br>(1.33)                          | 0.003<br>(1.16)                  |
| Pair's Tobin's Q                               | 0.002<br>(1.23)                          | 0.002<br>(0.91)                  |
| Ln Assets                                      | 0.002<br>(1.28)                          | 0.001<br>(0.43)                  |
| Constant                                       | 0<br>(0.05)                              | -0.001<br>(1.09)                 |
| Country FE                                     | Yes                                      | Yes                              |
| Firms  | 730                                      | 727                              |
| Countries                                      | 36                                       | 36                               |
| R-squared                                      | 0.04                                     | 0.03                             |



**Panel B:** Results from non-panel cross-sectional regressions. Dependent variables are pair's after-minus-before SOX unsystematic risk. The "before" period is the year-end of 2001. The "after" period is the mean of year-ends of 2003, 2004, and 2005. Each match pairs consists of a cross-listed company and a non-cross-listed matching firm from the same countries as cross-listed firms, with the propensity to cross-list (based on size, industry, and profitability). The coefficient of interest is that on the "exchange" variable (dummy for level-23 listing). In Column 1, the sample consists of firms from high-GDP (above median GDP) countries; in Column 2, firms from low-GDP countries; in Column 3, all firms.

|                             | High-<br>GDP<br>Countries | Low-<br>GDP<br>Countries | All<br>Countries |
|-----------------------------|---------------------------|--------------------------|------------------|
|                             | 1                         | 2                        | 3                |
| Exchange *                  | -0.001                    | <b>-0.018</b>            | -0.015           |
| LnAssets                    | -0.33                     | <b>(2.95)***</b>         | (2.79)***        |
| Exchange *                  |                           |                          | <b>0.013</b>     |
| LnAssets * HighGDP          |                           |                          | <b>(2.25)**</b>  |
| Exchange *                  |                           |                          | 0.003            |
| HighGDP                     |                           |                          | (0.62)           |
| LnAssets * HighGDP          |                           |                          | 0.007            |
|                             |                           |                          | (1.55)           |
| Exchange                    | -0.002                    | -0.006                   | -0.005           |
|                             | (1.22)                    | (1.23)                   | (1.13)           |
| Sales Growth                | 0                         | -0.006                   | -0.007           |
|                             | (0.17)                    | (1.37)                   | (1.64)           |
| Change in Pair<br>Tobin's Q | 0.002                     | 0.002                    | 0.002            |
|                             | (1.27)                    | (0.53)                   | (1.21)           |
| Pair Tobin's Q              | 0.001                     | -0.003                   | 0                |
|                             | (0.68)                    | (0.92)                   | (0.09)           |
| Ln Assets                   | 0                         | 0.003                    | 0.001            |
|                             | (0.01)                    | (1.10)                   | (0.88)           |
| Constant                    | 0                         | -0.001                   | 0                |
|                             | (0.03)                    | (0.44)                   | (0.32)           |
| Country FE                  | Yes                       | Yes                      | Yes              |
| Firms                       | 526                       | 246                      | 772              |
| Countries                   | 23                        | 19                       | 42               |
| R-squared                   | 0.01                      | 0.09                     | 0.05             |