

Sarbanes-Oxley and Corporate Risk-Taking

Leonce Bargeron, Kenneth Lehn, Chad Zutter
University of Pittsburgh

To be presented at the American Enterprise Institute

June 18, 2007

Abstract

Many policymakers and corporate executives have argued that the Sarbanes-Oxley Act of 2002 (“SOX”) has had a chilling effect on the risk-taking behavior of U.S. corporations. This paper empirically examines this proposition. Using a large sample of U.S. and U.K. companies, we find that compared with their U.K. counterparts U.S. firms have significantly reduced their R&D and capital expenditures and significantly increased their cash holdings since SOX. We also find that the equity of U.S. companies has become significantly less risky vis-à-vis U.K. companies since SOX. Finally, using a large sample of U.S. and U.K. initial public offerings (“IPOs”), we find that the likelihood that an IPO was conducted in the U.K. increased significantly after SOX and that this effect was especially high for firms in high R&D industries. Taken together, the results support the view that SOX has had a chilling effect on risk-taking by publicly traded U.S. corporations.

The authors gratefully acknowledge funding support for the preparation of this paper from the National Research Institute at the American Enterprise Institute.

Sarbanes-Oxley and Corporate Risk-Taking

Leonce Bargeron, Kenneth Lehn, and Chad Zutter
University of Pittsburgh
June 2007

1. Introduction

Many commentators, including both supporters and critics of the Sarbanes-Oxley Act of 2002 (“SOX”), have argued that SOX has had a chilling effect on risk-taking by U.S. corporations. Among other things, this legislation, which expanded federal regulation of corporate governance for publicly traded U.S. corporations, requires (i) chief executive officers and chief financial officers to certify financial statements, (ii) companies to file annual internal control reports that evaluate the effectiveness of the controls, and (iii) audit committees to comply with new regulations governing their composition and procedures. In addition, SOX tightened regulation of auditors and provided the SEC with expanded enforcement authority against auditors, officers, and directors.

One year after the legislation was signed into law, William Donaldson, then chairman of the Securities and Exchange Commission, stated that “I worry about the loss of risk-taking zeal. ...Sarbanes-Oxley unleashed batteries of lawyers across the country.

...[the result is] a huge preoccupation with the dangers and risks of making the slightest mistake, as opposed to a reasonable approach to legitimate business risk.”¹

Similarly, in July 2003, Alan Greenspan, then chairman of the Federal Reserve Board, stated that “corporate executives and boards of directors are seemingly unclear, in the wake of the recent intense focus on corporate behavior, about how an increase in risk-taking on their part would be viewed by shareholders and regulators. As a result, business leaders have been quite circumspect about embarking on major new investment projects.”²

Similar comments have been heard from the corporate community, especially from executives of companies in high-risk industries. For example, in 2004, Tom Siebel, former CEO of software company Siebel Systems, stated that “we might have killed the goose that lays the golden egg. ...You’re mitigating every possible risk that can be conceived. Risk didn’t used to be a bad thing.”³

This paper empirically examines the merits of the view that SOX has chilled risk-taking by U.S. corporations. Our analysis consists of two parts.

First, we examine whether several measures of corporate risk-taking have changed significantly for publicly traded U.S. companies since SOX was signed into law in 2002. Specifically, we examine two sets of measures: (i) accounting-based variables, which measure the level and types of investments firms make and (ii) stock-based variables, which measure the market’s assessment of a firm’s equity risk.

¹ Adrian Michaels, “After a Year of US Corporate Clean-Up, William Donaldson Calls for a Return to Risk-Taking,” *FinancialTimes.com*, July 24, 2003.

² Testimony of Chairman Alan Greenspan before the Committee on Financial Services, U.S. House of Representatives, July 15, 2003.

³ Tony Kontzer, “Siebel Sees Sarbanes-Oxley Taking Toll on Economy,” *Information Week*, October 13, 2004.

Using a sample of U.K. firms as a benchmark, we find that since the adoption of SOX U.S. companies have (i) significantly reduced expenditures on research and development (“R&D”), (ii) significantly reduced capital expenditures, and (iii) significantly increased holdings of cash, which represents non-operating, low-risk investments. Hence, the investment behavior of U.S. firms reveals a statistically significant reduction in risk-taking after the adoption of SOX.

The stock-based measures reveal that the equity of U.S. companies became less risky vis-à-vis U.K. companies after SOX. The standard deviation of stock returns (both daily and monthly), a conventional measure of a company’s equity risk, declined significantly for U.S. firms as opposed to their U.K. counterparts, in the post SOX period. Furthermore, the two components of total equity risk declined significantly for U.S. firms, as compared with the U.K. firms, after SOX. The market risk of U.S. firms, measured by their “betas” vis-à-vis a worldwide index, declined significantly as compared with the corresponding beta of U.K. firms in the post-SOX period. This result is especially pronounced for firms in high risk, R&D intensive industries. In addition, the firm-specific risk of U.S. firms, measured by the root mean square error from estimation of the market model, fell significantly more for U.S. firms versus their U.K. counterparts after SOX.

Second, we examine data on initial public offerings (“IPOs”) in the U.S. and U.K. to test whether the likelihood that a firm raises capital in U.S. versus U.K. public equity markets after the adoption of SOX is related to its R&D expenditures, which serves as a proxy for the risk of the firm’s activities. Using a sample of 9,258 initial public offerings (“IPOs”) conducted in the U.S. and U.K. from 1990-2006, we find that (i) the probability

that an IPO was conducted in the U.K. as opposed to the U.S. increased sharply after SOX and (ii) the higher a firm's R&D activity, the greater the increase in the probability the firm went public in the U.K. after SOX.

The paper is organized as follows. Section 2 describes the sample and data. Section 3 contains empirical results on risk-taking by U.S. corporations after SOX. Section 4 presents evidence on the relation between R&D activity and the choice of conducting an IPO in the U.S. versus the U.K. after SOX. Section 5 includes concluding comments.

2. Sample and data

Sample

Our sample consists of 5,228 U.S. and U.K. publicly traded corporations, including 4,239 U.S. corporations and 989 U.K. corporations, for which sufficient data exists on the Thomson One Banker database. These firms represent all U.S. and U.K. firms in the database for which there is consistent time series data, spanning the adoption of SOX, on the key variables used in the analysis. Specifically, to be included in the sample we required that the following variables were available for at least one year during the 1998-2000 and 2003-2005 periods: sales, earnings before interest and taxes EBIT, assets, capital expenditures, cash holdings and daily stock returns. Because data on R&D expenditures is considerably sparser, existing for only 1,980 firms (1,746 U.S. firms, 234 U.K. firms), we do not require data on R&D expenditures for each period in order for firms to be included in the sample.

The sample consists of both large and small companies. The U.S. sample includes 412, or 82.4%, of the companies in the S&P 500, indicating that most large U.S.

corporations are included in the sample. Similarly, 69, or 67.6%, of the companies in the U.K.'s FTSE 100 Index (there are 102 companies in the index) are included in the sample. The sample also includes relatively small companies. For example, the sample includes 331 U.S. companies with average sales during the post-SOX period of less than \$1 million and 75 U.K. companies with average sales of less than £1 million.

Table 1 shows the industry distribution of the U.S. and U.K. samples. Specifically, the table shows the number and percent of the two samples that operate in 74 different industries, defined by 2-digit SIC codes. The most represented industries in the U.S. sample are business services (15.9%), electrical and electronic equipment (8.3%), and paper and allied products (7.4%), while the most represented industries in the U.K. sample are holding and other investment offices (18.4%), business services (11.7%), and engineering and management services (5.4%). The least represented industries in the U.S. sample are museums, art galleries, botanical & zoological gardens (0.00%), legal services (0.02%), and justice, public order, and safety (0.02%). In the U.K. sample, nine of seventy-four industries are unrepresented: legal services; justice, public order, and safety; pipelines; agricultural production, environmental quality and housing; miscellaneous services, miscellaneous repair services; insurance carriers; and government agencies.

To determine whether the industry distributions of the two samples are similar, we calculated the correlation coefficient between the number of firms in each industry in the U.S. and U.K. samples. Across the 74 industries, the correlation coefficient is 0.64 and significant at the 0.01 level. Hence, the industry distributions of the two samples appear to be similar.

Data

Financial accounting data for the sample was collected from the Thomson One Banker database. For each firm in each year during the period of 1995 through 2005 we collected the following data: sales, EBIT, capital expenditures, R&D expenditures, total assets, and cash holdings. We express capital expenditures, R&D, cash, and EBIT as ratios to both assets and sales.

Data on stock prices, which is used to compute the stock-based risk measures, are collected from the Datastream database for both the U.S. and U.K. samples. Daily and monthly stock returns over the period of 1994 through 2006 are calculated from the daily adjusted stock prices. To estimate equity betas and root mean square errors for the U.S. and U.K. samples, we regress the daily returns of these companies on the corresponding returns of the MSCI World Index (“MSCI”), a value-weighted global index consisting of companies across 24 countries.

Summary statistics

Table 2 presents descriptive information about the key variables for the U.S. and U.K. samples over various periods predating and succeeding SOX. Panel A tabulates the accounting measures over three three-year periods, 1995-1997 and 1998-2000, two periods preceding SOX, and 2003-2005, one period after SOX. Panel B tabulates the stock-based measures over three four year periods, 1994-1997, 1998-2001, and 2003-2006.⁴ For each variable, we calculate the mean value for each firm within each period. We then calculate the mean and median values of these values for the U.S. and U.K.

⁴ Because accounting data for fiscal year 2006 is unavailable for many firms, accounting variables are compiled over three year periods. To minimize potential microstructure issues return based measures are compiled over four year periods using monthly data.

samples. For the sake of brevity, Table 2 presents only the median values for both the U.S. and U.K. samples.

The table reveals significant differences across the two samples.

The ratio of R&D expenditures to assets is significantly higher for the U.S. sample in all three periods. However, the difference in the ratio has declined over time. For the U.S. sample, the ratio of R&D expenditures to assets increased from 0.0705 during 1995-1997 to 0.0782 during 1998-2000, and then declined to 0.072 during 2003-2005, the post-SOX period. For the U.K. sample, this ratio increased steadily over the three periods, from 0.0189 to 0.0288 to 0.0334. The difference in the ratio across the U.S. and U.K. samples declined from 0.0516 to 0.0494 over the two pre-SOX periods to 0.0386 in the post-SOX period.

The ratio of capital expenditures to assets also is significantly higher for the U.S. sample in all three periods. However, here too, the difference in the ratio has declined over time. For the U.S. sample, this ratio has steadily declined from 0.0542 during 1995-1997 to 0.0488 during 1998-2000 to 0.0303 during 2003-2005. It also has declined steadily for the U.K. sample, from 0.0477 to 0.0428 to 0.0253. The difference in the ratio across the U.S. and U.K. samples declined from 0.0065 to 0.0060 over the two pre-SOX periods to 0.0050 in the post-SOX period.

The table reveals that the ratio of cash holdings to assets is significantly higher for the U.S. sample in all three periods and that this difference widened considerably in the post-SOX period. The ratio declined from 0.0947 during 1995-1997 to 0.0922 during 1998-2000, and then increased sharply to 0.1149 during the post-SOX period for the U.S. sample. In contrast, for the U.K. sample, the ratio increased slightly from 0.0826 to

0.0832 over the two pre-SOX periods and then declined to 0.0796 in the post-SOX period. The difference in the ratio of cash holdings to assets across the U.S. and U.K. samples declined from 0.0121 to 0.0091 over the two pre-SOX periods and then widened to 0.0353 in the post-SOX period.

Little difference exists in the profit rate of the two samples, as measured by the ratio of EBIT to assets. This profit rate has declined steadily over time for both samples, from 0.0864 to 0.0575 to 0.0470 for the U.S. sample. The corresponding decline for the U.K. sample is from 0.0833 to 0.0672 to 0.0420. The difference in profit rates across the two samples is not significant for the first pre-SOX period, significantly higher for the U.K. sample in the second pre-SOX period, and significantly higher for the U.S. sample in the post-SOX period. Hence, no discernible pattern exists in the relative profitability of the two samples over time, suggesting that the pattern of differences in R&D, capital expenditures, and cash holdings over time are related to factors other than differences in the profit rates of the two samples.

The standard deviation of stock returns, the measure of total equity risk, is significantly higher for the U.S. sample in all three periods. It increased from 0.1291 to 0.2074 over the two pre-SOX periods for the U.S. sample, then declined to 0.1394 in the post-SOX period. Similarly, the standard deviation of returns increased from 0.0746 to 0.1225 over the pre-SOX periods for the U.K. sample and then declined to 0.087 in the post-SOX period. The difference in this variable across the two samples increased from 0.0546 to 0.0849 over the two pre-SOX periods and then declined to 0.0524 in the post-SOX period.

The two components of equity risk, market and firm specific, also are significantly higher for the U.S. sample in all three periods. The equity beta for U.S. firms, measured against the MSCI World Index, increases steadily across the three periods, from 0.6534 to 0.9403 to 1.2314. Similarly, the beta of U.K. firms increases from 0.46 to 0.7012 to 1.087. The difference in the beta for U.S. versus U.K. firms increases from 0.1934 to 0.2391 over the two pre-SOX periods and then declines to 0.1444 in the post-SOX period.

The root mean square error of U.S. firms, a measure of firm specific risk, increases from 0.126 to 0.199 over the two pre-SOX periods and then declines to 0.1331 in the post-SOX period. The corresponding changes for the U.K. sample are an increase from 0.0719 to 0.1173, followed by a decline to 0.0828 in the post-SOX period. The difference across the two samples increases from 0.0541 to 0.0816 over the pre-SOX periods and then declines to 0.0503 in the post-SOX period.

In sum, the data in Table 2 broadly show that (i) the proxies for risk-taking are significantly different for U.S. versus U.K. firms both before and after SOX and (ii) the differences in these proxies have changed since SOX in ways consistent with the view that SOX has chilled corporate risk-taking in the U.S. We now test more systematically whether there has been a statistically significant change in the proxies for risk-taking for U.S. corporations versus their U.K. counterparts.

3. Empirical results

To examine whether risk-taking by publicly traded U.S. corporations declined significantly after Sarbanes-Oxley, we conduct two sets of tests. The first set examines accounting-based variables to test whether there was a significant change in the level and

risk of investments made by U.S. companies after the adoption of SOX. The second set examines stock-based variables to test whether the market's assessment of the equity risk of U.S. versus U.K. companies changed significantly after SOX.

Accounting-based measures of the level and risk of corporate investment

We first consider three variables that describe the types of assets in which firms invest – R&D expenditures, capital expenditures, and cash holdings – before and after the adoption of SOX. For each firm in the U.S. and U.K. samples we calculate the mean value of (i) the ratio of R&D expenditures to assets, (ii) the ratio of capital expenditures to assets, and (iii) the ratio of cash holdings to assets in the 1995-1997, 1998-2000, and 2003-2005 periods. For each firm, we calculate the difference in the mean value of the respective variable during the post-SOX period and the corresponding mean values during 1995-1997 and 1998-2000, the two pre-SOX periods. We then calculate the median differences in these values for the entire sample of U.S. and U.K. companies. A negative median difference indicates that for the median firm the value of the respective variable declined in the post-SOX period.

Table 3 contains the median differences in values of the R&D, capital expenditures, and cash holdings variables for the U.S. and U.K. samples. The median ratio of R&D expenditures to assets declined for both samples after SOX, but the decline was larger for the U.S. sample. Using the period of 1998-2000 as the benchmark, the median changes were -0.00250 for the U.S. sample and -0.00045 for the U.K. sample, a difference that is significant at the 0.05 level. This difference is even larger when the period of 1995-1997 is used as the benchmark period (-0.00361 for the U.S., -0.00069 for the U.K.) and this difference is significant at the 0.01 level.

The median ratio of capital expenditures to assets also declined for both samples from before to after SOX, and, here too, the decline was larger for U.S. firms. When compared against the pre-SOX period of 1998-2000, the median difference in the U.S. was -0.01379, as compared with -0.00927 in the U.K. This difference across the two samples is not statistically significant. However, when compared with the 1995-1997 period, the median difference in the capital expenditures variables is significantly more negative for the U.S. (-0.01783) versus the U.K. sample (-0.01076). This difference is significant at the 0.01 level.

Table 3 shows that after SOX the median ratio of cash holdings to assets increased for the U.S. sample and decreased for the U.K. sample. Using the 1998-2000 benchmark period, the cash holdings to assets ratio of the median U.S. company increased by 0.0078 after SOX, as compared with a decrease of 0.00266 for the U.K. sample. The difference across the two samples is significant at the 0.01 level. Similar results obtain when the 1995-1997 period is used as the benchmark pre-SOX period.

In short, the results show that when examining the full sample of U.S. and U.K. firms, there was a statistically significant decline in R&D and capital expenditures of U.S. firms versus their U.K. counterparts and a statistically significant increase in the relative cash holdings of U.S. firms. Because R&D and capital expenditures involve outlays on risky projects and cash holdings represent investments in non-operating low risk assets, this evidence is consistent with the view that SOX has chilled risk-taking activity by U.S. corporations.

To probe whether the changes in risk-taking activity varied across industries, we divide the sample into three groups – firms operating in industries with high, moderate,

and low R&D activity. We define high, moderate, and low R&D industries based on total U.S. industry R&D expenditure over the benchmark period of 1994-1997. Seven 2-digit SIC code industries account for 92.1% of R&D expenditure in the U.S. during this period: chemicals and allied products, transportation equipment, industrial machinery and equipment, electrical and electronic equipment, business services, instruments and related products, and communications.. We disaggregate the seven 2-digit SIC code industries into their thirty-seven 3-digit SIC code industry components. We classify the fifteen of these 3-digit SIC code industries that account for at least 1% of the total U.S. R&D expenditure during the period as high R&D industries. We define the remaining twenty-two of these 3-digit SIC code industries as moderate R&D industries. We also classify the seventeen remaining 2-digit SIC code industries with at least \$100 million in total R&D expenditure during the period as medium R&D industries. Finally, we classify the fifty-four 2-digit SIC code industries with less than \$100 million in total R&D expenditure during the period as low R&D industries.

Table 4 presents the differences reported for the full sample in Table 3 across the three industry groups. The differences in the post-SOX values and the corresponding values over 1998-2000 and 1995-1997 are reported in Panels A and B, respectively. Whereas a significant decline in the R&D to assets and capital expenditures to assets ratios of U.S. versus U.K. firms exists for the full sample, the results within the subgroups of industries are weaker. For most subgroups the decline in R&D and capital expenditures is larger in the U.S. after SOX, but for most subgroups the differences are not significant at the 0.05 level. In contrast, the median increase in cash holdings of U.S.

firms is significantly higher after SOX than the corresponding change in the cash holdings of U.K. firms for most subgroups.

Stock-based measures of risk

Evidence on changes in the stock-based measures of risk after SOX are contained in Tables 5 and 6.

For each firm, we calculate three measures of risk over three four-year periods. The risk measures are the standard deviation of monthly stock returns, the estimated beta from a one factor market model in which the firm's returns are regressed on the corresponding returns of the MSCI World Index, and the root mean square error from this market model.

The three risk measures are estimated over one four-year period, 2003-2006, following the adoption of SOX, and two four-year periods, 1994-1997 and 1998-2001, before the adoption of SOX. We use four year periods for this analysis because unlike the accounting data, which for many firms was only available on the Thomson database for three years after SOX, stock return data was available on Datastream for four years after SOX. Hence, in order to take advantage of additional post-SOX data we chose to use a four-year period after SOX. To make the post-SOX data comparable to pre-SOX data, we also chose to use four year periods in the pre-SOX period.

Table 5 reveals that all three stock-based risk measures declined significantly for U.S. firms as compared with U.K. firms after the adoption of SOX. The median standard deviation of monthly stock returns declined by 0.0506 for the U.S. sample in the post-SOX period as compared with the pre-SOX period of 1998-2001. The corresponding decline for the U.K. sample is 0.0326. The difference in the median declines is significant

at the 0.01 level. The median standard deviation of monthly stock returns also declined more significantly for U.S. firms in the post-SOX period as compared with the pre-SOX period of 1994-1997.

The median beta of U.S. firms vis-à-vis the MSCI World Index increased by 0.27 in the post-SOX period as compared with the pre-SOX period of 1998-2000. The corresponding median increase for the U.K. sample is 0.3411. This difference in median values also is significant at the 0.05 level. Similarly, the median beta of U.S. firms increased during the post-SOX period as compared with the pre-SOX period of 1994-1997, but this difference was significantly less (at the 0.05 level) than the corresponding increase for the U.K. sample.

Finally, the median root mean square error, the measure of firm specific risk, declined by 0.0489 for the U.S. sample in the post-SOX period as compared with the pre-SOX period of 1998-2001. The corresponding decline for the U.K. sample is 0.0320. This difference in the median declines across the two samples is significant at the 0.01 level. The two median declines are smaller when measured against the pre-SOX period of 1994-1997, but here again the decline is significantly larger for the U.S. versus the U.K. sample.

Table 6 presents the differences reported for the full sample in Table 5 for the three industry subgroups. The stock-based risk measures generally declined significantly more for the U.S. sample versus the U.K. sample across the industry groups.

All three risk measures declined significantly more, at the 0.05 level, for the U.S. sample as compared with the U.K. sample for the high R&D group. For example, when compared against the 1998-2001 period, the median standard deviation of returns for U.S.

firms in the high R&D subgroup declined by 0.0803 after SOX, as compared with a decline of only 0.0509 for the U.K. sample. The corresponding median beta increased by only 0.0401 for the U.S. sample, as compared with an increase of 0.2819 for the U.K. sample. The corresponding median root mean square error declined in the post-SOX period by 0.0749 for the U.S. sample as compared with a decline of only 0.0486 for the U.K. sample. Similar results obtain when the post-SOX period is compared with the pre-SOX period of 1994-1997. The two other stock-based risk measures also decline significantly more for the U.S. versus the U.K. sample in the post-SOX period across the moderate and low R&D subgroups.

4. R&D expenditures, IPOs, and SOX

In addition to examining whether measures of risk-taking by U.S. companies changed significantly after SOX, we examine whether firms operating in risky industries were more likely to go public in the U.K. versus the U.S. after SOX. We first describe the sample and data used in the analysis and then present the results.

Sample and data

The sample of U.S. and U.K. IPOs is collected from the Securities Data Company's (SDC) Global New Issues Database. The sample consists of all completed common stock IPOs for the period 1990 through 2006 where the listing exchange is located in either the U.S. or U.K. The sample includes 9,262 IPOs, consisting of 1,882 U.K. IPOs (20% of the sample) and 7,380 U.S. IPOs (80% of the sample).

Table 7 contains summary information on characteristics of the IPOs before and after SOX. Of the 7,380 U.S. IPOs, 6,417, or 87%, occurred before SOX. Of the 1,882

U.K. IPOs, 1,284, or 68%, occurred before SOX. Hence, a substantially higher percentage of U.K. IPOs occurred after SOX than in the U.S.

Of the 6,417 U.S. IPOs that occurred before SOX, 2,472, or 39%, were done by firms in high R&D industries (using the taxonomy of industries described above). Of the 963 U.S. IPOs after SOX, only 283, or 29%, were done by firms in high R&D industries. Hence, the percentage of U.S. IPOs accounted for by firms in high R&D industries declined substantially after SOX. In contrast, there was little change in this percentage for the U.K. sample, from 24% before SOX (i.e., 314 of 1,284 IPOs) to 22% after SOX (i.e., 154 of 598 IPOs).

Similarly, the percentage of U.S. IPOs accounted for by firms in low R&D industries increased substantially after SOX, from 39% (i.e., 2,501 of 6,417 IPOs) to 52% (i.e., 501 of 963 IPOs). The percentage of U.K. IPOs accounted for by firms in low R&D industries actually declined from 53% before to 49% after SOX. Hence, the difference in these percentages across the U.S. and U.K. changed substantially from before to after SOX.

Total proceeds raised in IPOs differ substantially across the two samples. Over the entire period of 1990-2006, total proceeds raised in U.S. IPOs were \$911 billion, as compared with \$186 billion in U.K. IPOs. Of the total proceeds, 75% were raised before SOX for the U.S. sample, versus 79% for the U.K. sample. The percentage of proceeds raised by firms in high R&D industries declined substantially for the U.S. sample after SOX, from 34% (i.e., \$229,088 of \$680,840) to 17% (i.e., \$39,259 of \$230,286). In contrast, this percentage increased slightly in the U.K., from 10% (i.e., \$14,690 of \$147,639) to 12% (i.e., \$4,484 of \$38,687).

A dramatic difference exists in the percentage of proceeds raised by firms in low risk industries in the U.S. and U.K. before and after SOX. For the U.S. sample of IPOs, this percentage increased substantially from 39% before SOX (i.e., \$263,519 of \$680,840) to 65% after SOX (i.e., \$148,609 of \$230,286). For the U.K. sample, this percentage decreased substantially, from 59% before SOX (i.e., \$87,203 of \$147,639) to 40% after SOX (i.e., \$15,512 of \$38,687).

To the extent that SOX has dampened risk-taking by U.S. corporations, it is possible that the U.S. IPO market would soften as a result. In particular, private firms in the U.S. may opt more often to remain private vis-à-vis go public in the post-SOX era.

Figure 1 shows the relative percentages of IPOs going public in the U.S. versus the U.K. each year during the period of 1990 through 2006. It can be seen that the relative percentage of U.K. IPOs has increased dramatically, suggesting that more U.S. firms are opting to remain private in response to the SOX legislation. It is possible, however, that the change in relative percentages shown in Figure 1 is not due to a reduction in U.S. IPOs, but rather an increase in the number of U.K. IPOs vis-à-vis the number of U.S. IPOs.

Figure 2 reveals that the number of IPOs in the U.S. has decreased substantially post SOX, whereas the number of IPOs in the U.K. is not remarkably different from historic levels. Thus, Figure 2 strengthens the notion that fewer U.S. firms are going public after SOX.

Another potential explanation for the rise in the relative percentage of U.K. IPOs shown in Figure 1 and the decrease in U.S. IPOs shown in Figure 2 is that the reduction in U.S. IPO activity occurred because of a downturn in the U.S. stock market, not SOX.

Although there is considerable empirical evidence relating IPO volume to stock market performance, for the U.S. stock market to explain the relative changes shown in Figures 1 and 2 between U.S. and U.K. IPO markets the U.K. stock market cannot be highly correlated with the U.S. stock market. On the contrary, Figure 3 shows that the U.K. stock market is highly correlated with the U.S. stock market, represented by the FTSE All Share and the CRSP Value Weighted indices respectively. The figure clearly shows that the two stock markets run in parallel through time. The correlation in returns over the 1990 through 2006 time period is 0.73. Moreover to the extent that a difference in stock market performances explains the difference in IPO markets, Figure 3 suggests that the U.S. IPO market, and not the U.K. IPO market, should be gaining in relative strength since the U.S. stock market has been outpacing the U.K. stock market during the post-SOX period.

Overall, the summary data discussed above suggests that IPO activity has decreased in the U.S. vis-à-vis the U.K. since SOX, especially among firms operating in high R&D industries. We next turn to empirical tests of this proposition.

Empirical results

Table 8 presents results from a logit model in which we estimate the likelihood that a firm goes public in the U.K. versus the U.S. over the period of 1990-2006. The dependent variable takes the value of 1 if the IPO occurs in the U.K. and 0 if the IPO occurs in the U.S. The independent variables include the log of proceeds raised in the IPO, dummy variables for whether or not the firm is in a high or moderate R&D industry, a dummy variable if the IPO occurred after SOX, and two interaction variables consisting

of the product of the post-SOX dummy variable and the dummy variables for firms in high and moderate R&D industries.

All of the independent variables enter with estimated coefficients that are significant at the 0.01 level. Log of proceeds enters with a negative coefficient, indicating that larger firms are more likely to go public in the U.S. Both dummy variables for firms operating in high and moderate R&D industries enter with negative and significant coefficients (-0.865 and -0.423, respectively), indicating that compared with low R&D firms these firms were more likely to do IPOs in the U.S.

The dummy variable for post-SOX IPOs enters with a positive coefficient, indicating that in the years after SOX there was an increase in the likelihood that firms would do IPOs in the U.K. The two variables that interact the post-SOX dummy variable with high and moderate R&D enter with positive coefficients (0.542 and 0.707, respectively), indicating that after SOX, firms operating in high and moderate R&D industries were more likely to do IPOs in the U.K. This result is consistent with the proposition that SOX has had a chilling effect on corporate risk-taking and that, at the margin, firms operating in risky industries have increasingly conducted IPOs in the U.K. since SOX.

5. Concluding comments

This paper empirically examines whether risk-taking for U.S. firms vis-à-vis U.K. firms decreases between the pre-SOX and post-SOX periods. We approach the question from three different angles and find the results from each tell a similar story. Measures of risk for U.S. firms are generally lower in the post-SOX period than in the pre-SOX period. Moreover, decreases (increases) in risk measures for U.S. firms between the pre-

SOX and post-SOX periods are generally larger (smaller) than decreases (increases) in risk measures for U.K. firms between the same periods. These results are consistent with the hypothesis that SOX has chilled risk-taking by U.S. corporations.

First, we investigate accounting-based measures of risk. We find that since the adoption of SOX U.S. companies have (i) significantly reduced expenditures on R&D, (ii) significantly reduced capital expenditures, and (iii) significantly increased holdings of cash relative to U.K. firms. Subsequent to SOX U.S. firms have shied away from investments in R&D and capital expenditures in comparison to U.K. firms, preferring to hold more cash.

Second, we analyze stock-based measures of risk. We find that total risk and its two components, market risk and firm specific risk, have also decreased relative to U.K. firms since the adoption of SOX. Interestingly, the results are strongest in the high risk, R&D intensive industries. Hence, in addition to reducing risky investment subsequent to SOX, U.S. firms have reduced their equity risk relative to U.K. firms, particularly among those firms in riskier industries.

Finally, using a large sample of IPOs in the U.S. and U.K. during the period of 1990-2006, we find that the likelihood that an IPO occurred in the U.K. increased significantly after SOX and that this effect is especially pronounced for firms operating in high risk industries. This result is consistent with the view that SOX discourages risky firms from raising capital in U.S. public equity markets and it provides additional support for the view that SOX has had a chilling effect on risk-taking behavior by publicly traded U.S. corporations.

Percentage of IPOs by Year by Country

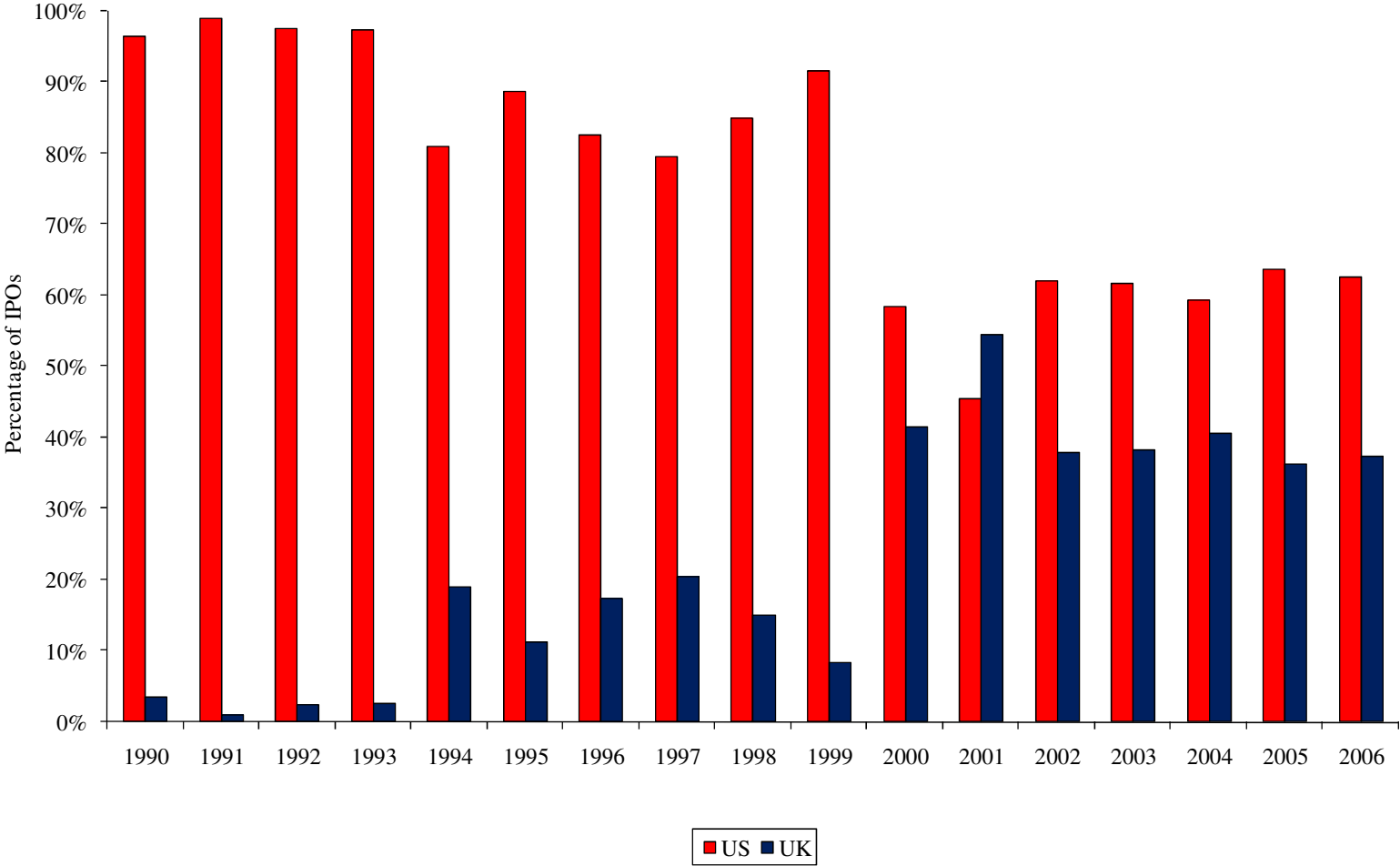


Fig. 1 Percentage of IPOs by Year by Country

Number of IPOs by Year by Country

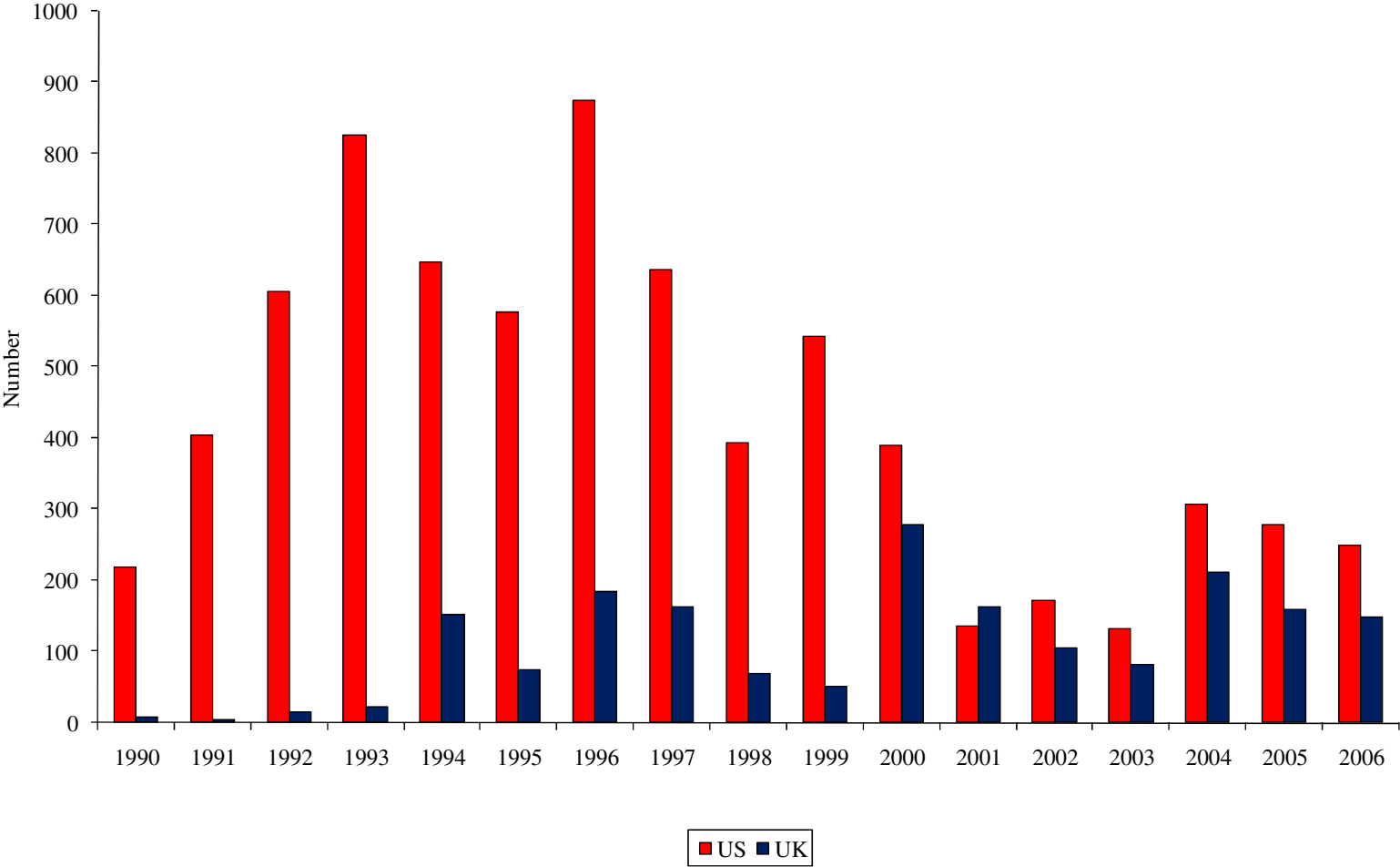


Fig. 2 Number of IPOs by Year by Country

Monthly CRSP Value Weighted vs FTSE All Share

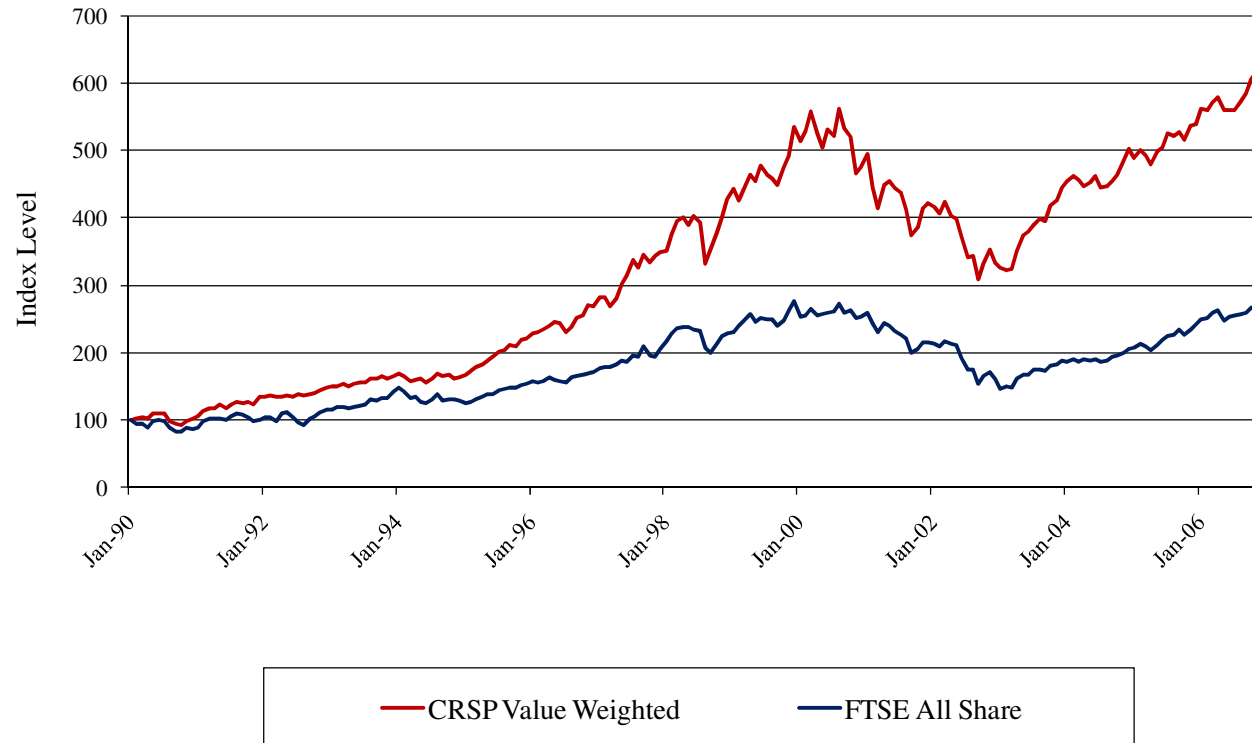


Fig. 3 Monthly CRSP Value Weighted and the FTSE All Share Indices Returns

Table 1: Industry Distribution

This table details the distribution of firms across industries for the U.K. sample and the U.S. sample. The first column lists the industry description for the 2-digit SIC code. The next two columns tabulate the number of firms in each industry for the U.K sample and the percentage of the entire U.K. sample represented by that industry. The last two columns repeat the analysis for the U.S. sample.

Industry Description	UK Firms	% of UK	US Firms	% of US
Agricultural production- crops	2	0.2%	10	0.2%
Agricultural production- livestock	0	0.0%	4	0.1%
Agricultural services	2	0.2%	5	0.1%
Forestry	3	0.3%	1	0.0%
Metal mining	6	0.6%	20	0.5%
Coal mining	3	0.3%	5	0.1%
Oil and gas extraction	16	1.6%	133	3.1%
Nonmetallic minerals, except fuels	2	0.2%	5	0.1%
General building contractors	25	2.5%	28	0.7%
Heavy construction contractors	1	0.1%	8	0.2%
Special trade contractors	6	0.6%	13	0.3%
Food and kindred products	21	2.1%	81	1.9%
Tobacco manufactures	3	0.3%	5	0.1%
Textile mill products	7	0.7%	14	0.3%
Apparel and other textile products	11	1.1%	37	0.9%
Lumber and wood products	1	0.1%	15	0.4%
Furniture and fixtures	3	0.3%	21	0.5%
Paper and allied products	6	0.6%	32	0.8%
Printing and publishing	19	1.9%	43	1.0%
Chemicals and allied products	43	4.3%	306	7.2%
Petroleum and coal products	2	0.2%	17	0.4%
Rubber and misc. plastics products	7	0.7%	39	0.9%
Leather and leather products	2	0.2%	13	0.3%
Stone, clay, glass, and concrete prod.	14	1.4%	24	0.6%
Primary metal industries	8	0.8%	53	1.3%
Fabricated metal products	18	1.8%	56	1.3%
Industrial machinery and equipment	17	1.7%	207	4.9%
Electrical and electronic equipment	36	3.6%	350	8.3%
Transportation equipment	14	1.4%	88	2.1%
Instruments and related products	26	2.6%	314	7.4%
Miscellaneous manufacturing industries	9	0.9%	47	1.1%
Railroads	1	0.1%	9	0.2%
Local and interurban passenger transit	4	0.4%	1	0.0%
Motor freight transportation and warehousing	3	0.3%	25	0.6%
Water transportation	5	0.5%	12	0.3%
Transportation by air	7	0.7%	30	0.7%
Pipelines, except natural gas	0	0.0%	5	0.1%
Transportation services	8	0.8%	15	0.4%
Communications	14	1.4%	142	3.3%

Electric, gas, and sanitary services	16	1.6%	155	3.7%
Wholesale trade--durable goods	35	3.5%	112	2.6%
Wholesale trade--nondurable goods	14	1.4%	67	1.6%
Building materials, hardware, garden supply	3	0.3%	5	0.1%
General merchandise stores	5	0.5%	25	0.6%
Food stores	6	0.6%	18	0.4%
Automotive dealers and gas service stations	5	0.5%	17	0.4%
Apparel and accessory stores	9	0.9%	50	1.2%
Furniture, home furnishings and equip. stores	2	0.2%	26	0.6%
Eating and drinking places	17	1.7%	66	1.6%
Miscellaneous retail	18	1.8%	63	1.5%
Depository institutions	2	0.2%	3	0.1%
Nondepository credit institutions	10	1.0%	38	0.9%
Security, commodity brokers, and services	13	1.3%	55	1.3%
Insurance carriers	0	0.0%	10	0.2%
Insurance agents, brokers, and service	3	0.3%	9	0.2%
Real estate	47	4.8%	57	1.3%
Holding and other investment offices	182	18.4%	159	3.8%
Hotels and other lodging places	8	0.8%	25	0.6%
Personal services	3	0.3%	12	0.3%
Business services	116	11.7%	676	15.9%
Automotive repair, services, and parking	4	0.4%	16	0.4%
Miscellaneous repair services	0	0.0%	7	0.2%
Motion pictures	9	0.9%	25	0.6%
Amusement and recreational services	24	2.4%	53	1.3%
Health services	1	0.1%	85	2.0%
Legal services	0	0.0%	1	0.0%
Educational services	5	0.5%	17	0.4%
Social services	3	0.3%	9	0.2%
Museums, art galleries, botanical gardens	1	0.1%	0	0.0%
Engineering and management services	53	5.4%	128	3.0%
Miscellaneous services	0	0.0%	5	0.1%
Justice, public order, and safety	0	0.0%	1	0.0%
Environmental quality and housing	0	0.0%	3	0.1%
Government & government agencies	0	0.0%	8	0.2%
All Industries	989	100.0%	4,239	100.0%

Table 2: Summary Statistics - Accounting and Stock-Based Variables

Panel A summarizes the key accounting variables for the three periods 1995-1997, 1998-2000, and 2003-2005. The ratios of CAPEX, R&D, CASH, and EBIT to ASSETS are calculated for each firm-year and the mean value for each firm over the three year period is computed. Panel B summarizes the key stock-based risk variables for the three periods 1994-1997, 1998-2001, and 2003-2006. Each firm's standard deviation of returns and market model estimates of firm beta and root mean square error are estimated over each four year period using monthly returns. The first two columns tabulate the median value within each country. The third column lists the difference between the median for the U.S. and the median for the U.K. The final column lists the p-value from Wilcoxon rank sum tests for differences between the countries. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

Panel A	US	UK	US - UK	p-value
RD/ASSETS				
1995 - 1997	0.0705	0.0189	0.0516	0.000***
1998 - 2000	0.0782	0.0288	0.0494	0.000***
2003 - 2005	0.0720	0.0334	0.0386	0.000***
CAPEX/ASSETS				
1995 - 1997	0.0542	0.0477	0.0065	0.000***
1998 - 2000	0.0488	0.0428	0.0060	0.000***
2003 - 2005	0.0303	0.0253	0.0050	0.000***
CASH/ASSETS				
1995 - 1997	0.0947	0.0826	0.0121	0.002***
1998 - 2000	0.0922	0.0832	0.0091	0.001***
2003 - 2005	0.1149	0.0796	0.0353	0.000***
EBIT/ASSETS				
1995 - 1997	0.0864	0.0833	0.0032	0.194
1998 - 2000	0.0575	0.0672	-0.0097	0.000***
2003 - 2005	0.0470	0.0420	0.0049	0.041**
Panel B	US	UK	US - UK	p-value
STD RETURNS				
1994 - 1997	0.1291	0.0746	0.0546	0.000***
1998 - 2001	0.2074	0.1225	0.0849	0.000***
2003 - 2006	0.1394	0.0870	0.0524	0.000***
BETA				
1994 - 1997	0.6534	0.4600	0.1934	0.000***
1998 - 2001	0.9403	0.7012	0.2391	0.000***
2003 - 2006	1.2314	1.0870	0.1444	0.000***
RMSE				
1994 - 1997	0.1260	0.0719	0.0541	0.000***
1998 - 2001	0.1990	0.1173	0.0816	0.000***
2003 - 2006	0.1331	0.0828	0.0503	0.000***

Table 3: Changes in Accounting Measures of Risk – All Firms

This table compares pre-SOX to post-SOX changes in accounting measures of risk in US firms to the changes in UK firms using all firms in our sample. The first column compares the Post-SOX 2003-2005 period to the Pre-SOX 1998-2000 period. The last column compares the Post-SOX 2003-2005 period to the Pre-SOX 1995-1997 period. The variables of interest are the firm level differences in the ratio of R&D expenditures to assets (RD/ASSETS), the ratio of capital expenditures to assets (CAPEX/ASSETS), the ratio of CASH to assets (CASH/ASSETS), and the ratio of EBIT to assets (EBIT/ASSETS) between the periods. For each firm we calculate the difference in the mean value of the variable between the early period and the later period. A negative difference indicates the variable declined in the post-SOX period. We then compare the distributions of differences of U.S. and U.K. firms using Wilcoxon rank sum tests. The bracketed terms describe whether the U.S. differences were higher or lower than expected relative to the U.K. differences based on the sum of scores. The p-values for the significance of the tests are in italics. The median difference for each country and the number of observations for each country are also tabulated. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

	Post-SOX vs Pre-SOX 1998-2000	Post-SOX vs Pre-SOX 1995-1997
RD/ASSETS	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.027**</i>	<i>0.006***</i>
Median Diff. UK	-0.00045	-0.00069
Median Diff. US	-0.00250	-0.00361
# Obs. - UK	234	159
# Obs. - US	1,746	953
CAPEX/ASSETS	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.180</i>	<i>0.001***</i>
Median Diff. UK	-0.00927	-0.01076
Median Diff. US	-0.01379	-0.01783
# Obs. - UK	989	716
# Obs. - US	4,239	2,378
CASH/ASSETS	[US HIGHER]	[US HIGHER]
<i>p-value</i>	<i>0.000***</i>	<i>0.000***</i>
Median Diff. UK	-0.00266	-0.00313
Median Diff. US	0.00780	0.00758
# Obs. - UK	989	716
# Obs. - US	4,239	2,378
EBIT/ASSETS	[US HIGHER]	[US HIGHER]
<i>p-value</i>	<i>.002***</i>	<i>0.279</i>
Median Diff. UK	-0.01226	-0.02014
Median Diff. US	-0.01369	-0.02560
# Obs. - UK	988	714
# Obs. - US	4,091	2,284

Table 4 Panel A: Changes in Accounting Measures of Risk - By R&D Group

Panel A compares the changes in accounting measures of risk between the post-SOX 2003-2005 and pre-SOX 1998-2000 periods in US firms to the changes in UK firms for each of the three R&D groups. The variables of interest are the firm level differences in the ratio of R&D expenditures to assets (RD/ASSETS), the ratio of capital expenditures to assets (CAPEX/ASSETS), the ratio of CASH to assets (CASH/ASSETS), and the ratio of EBIT to assets (EBIT/ASSETS) between the periods. For each firm we calculate the difference in the mean value of the variable between the early period and the later period. A negative difference indicates the variable declined in the post-SOX period. We then compare the distributions of differences of U.S. and U.K. firms for each R&D group using Wilcoxon rank sum tests. The bracketed terms describe whether the U.S. differences were higher or lower than expected relative to the U.K. differences based on the sum of scores. The p-values for the significance of the tests are in italics. The median difference for each country and the number of observations for each country are also tabulated. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

	High R&D	Mod. R&D	Low R&D
RD/ASSETS	[US LOWER]	[US LOWER]	[US HIGHER]
<i>p-value</i>	<i>0.206</i>	<i>0.067*</i>	<i>0.723</i>
Median Diff. UK	-0.00074	-0.00038	-0.00180
Median Diff. US	-0.00595	-0.00137	0.00048
# Obs. - UK	124	92	18
# Obs. - US	1,189	445	112
CAPEX/ASSETS	[US HIGHER]	[US HIGHER]	[US LOWER]
<i>p-value</i>	<i>0.085*</i>	<i>0.856</i>	<i>0.623</i>
Median Diff. UK	-0.02197	-0.01276	-0.00018
Median Diff. US	-0.01933	-0.01252	-0.00908
# Obs. - GBR	188	278	523
# Obs. - USA	1,584	1,306	1,349
CASH/ASSETS	[US HIGHER]	[US HIGHER]	[US HIGHER]
<i>p-value</i>	<i>0.165</i>	<i>0.000***</i>	<i>0.001***</i>
Median Diff. UK	-0.01973	-0.00685	-0.00030
Median Diff. US	0.00792	0.00703	0.00861
# Obs. - UK	188	278	523
# Obs. - US	1,584	1,306	1,349
EBIT/ASSETS	[US HIGHER]	[US HIGHER]	[US HIGHER]
<i>p-value</i>	<i>0.003***</i>	<i>0.001***</i>	<i>0.931</i>
Median Diff. UK	-0.05635	-0.03238	-0.00393
Median Diff. US	-0.01074	-0.01630	-0.01296
# Obs. - UK	188	277	523
# Obs. - US	1,499	1,284	1,308

Table 4 Panel B: Changes in Accounting Measures of Risk - By R&D Group

Panel B compares the changes in accounting measures of risk between the post-SOX 2003-2005 and pre-SOX 1995-1997 periods in US firms to the changes in UK firms for each of the three R&D groups. The variables of interest are the firm level differences in the ratio of R&D expenditures to assets (RD/ASSETS), the ratio of capital expenditures to assets (CAPEX/ASSETS), the ratio of CASH to assets (CASH/ASSETS), and the ratio of EBIT to assets (EBIT/ASSETS) between the periods. For each firm we calculate the difference in the mean value of the variable between the early period and the later period. A negative difference indicates the variable declined in the post-SOX period. We then compare the distributions of differences of U.S. and U.K. firms for each R&D group using Wilcoxon rank sum tests. The bracketed terms describe whether the U.S. differences were higher or lower than expected relative to the U.K. differences based on the sum of scores. The p-values for the significance of the tests are in italics. The median difference for each country and the number of observations for each country are also tabulated. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

	High R&D	Mod. R&D	Low R&D
RD/ASSETS	[US LOWER]	[US LOWER]	[US HIGHER]
<i>p-value</i>	<i>0.085*</i>	<i>0.033**</i>	<i>0.803</i>
Median Diff. UK	0.00047	-0.00104	-0.00670
Median Diff. US	-0.00702	-0.00259	-0.00133
# Obs. - UK	73	74	12
# Obs. - US	624	281	48
CAPEX/ASSETS	[US HIGHER]	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.776</i>	<i>0.353</i>	<i>0.121</i>
Median Diff. UK	-0.02623	-0.01911	0.00000
Median Diff. US	-0.02218	-0.01913	-0.01001
# Obs. - UK	118	224	374
# Obs. - US	790	799	789
CASH/ASSETS	[US HIGHER]	[US HIGHER]	[US HIGHER]
<i>p-value</i>	<i>0.005***</i>	<i>0.004***</i>	<i>0.002***</i>
Median Diff. UK	-0.04286	-0.01129	0.00068
Median Diff. US	0.01471	0.00479	0.00853
# Obs. - UK	118	224	374
# Obs. - US	790	799	789
EBIT/ASSETS	[US HIGHER]	[US HIGHER]	[US HIGHER]
<i>p-value</i>	<i>0.012**</i>	<i>0.432</i>	<i>0.255</i>
Median Diff. UK	-0.08913	-0.03678	-0.01065
Median Diff. US	-0.03689	-0.02864	-0.01523
# Obs. - UK	118	223	373
# Obs. - US	740	783	761

Table 5: Changes in Stock-Based Measures of Risk – All Firms

This table compares the pre-SOX to post-SOX changes in the stock-based measures of risk. The first column compares the Post-SOX 2003-2006 period to the Pre-SOX 1998-2001 period. The last column compares the Post-SOX 2003-2006 period to the Pre-SOX 1994-1997 period. The variables of interest are firm level differences in monthly standard deviation of returns (STD of Returns) between the periods, and firm level differences in the market model estimates of beta (Beta) and the root mean square error (RMSE) between the periods. For each firm we calculate the difference in the mean value of the variable between the early period and the later period. A negative difference indicates the variable declined in the post-SOX period. We then compare the distributions of differences of U.S. and U.K. firms using Wilcoxon rank sum tests. The bracketed terms describe whether the U.S. differences were higher or lower than expected relative to the U.K. differences based on the sum of scores. The p-values for the significance of the tests are in italics. The median difference for each country and the number of observations for each country are also tabulated. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

	Post-SOX vs Pre-SOX 1998-2001	Post-SOX vs Pre-SOX 1994-1997
STD of Returns	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.000***</i>	<i>0.000***</i>
Median Diff. UK	-0.0326	0.0027
Median Diff. US	-0.0506	-0.0035
# Obs. - UK	989	716
# Obs. - US	4,239	2,378
Beta	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.014**</i>	<i>0.047**</i>
Median Diff. UK	0.3411	0.5760
Median Diff. US	0.2700	0.5493
# Obs. - UK	989	716
# Obs. - US	4,239	2,378
RMSE	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.000***</i>	<i>0.000***</i>
Median Diff. UK	-0.0320	-0.0002
Median Diff. US	-0.0489	-0.0059
# Obs. - UK	989	716
# Obs. - US	4,239	2,378

Table 6 Panel A: Changes in Stock-Based Measures of Risk – By R&D Group

Panel A compares the changes in the stock-based measures of risk between the post-SOX 2003-2006 and pre-SOX 1998-2001 periods in US firms to the changes in UK firms for each of the three R&D groups. The variables of interest are firm level differences in monthly standard deviation of returns (STD of Returns) between the periods, and firm level differences in the market model estimates of beta (Beta) and the root mean square error (RMSE) between the periods. For each firm we calculate the difference in the mean value of the variable between the early period and the later period. A negative difference indicates the variable declined in the post-SOX period. We then compare the distributions of differences of U.S. and U.K. firms for each R&D group using Wilcoxon rank sum tests. The bracketed terms describe whether the U.S. differences were higher or lower than expected relative to the U.K. differences based on the sum of scores. The p-values for the significance of the tests are in italics. The median difference for each country and the number of observations for each country are also tabulated. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

	High R&D	Mod. R&D	Low R&D
STD of Returns	[US LOWER]	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.002***</i>	<i>0.054*</i>	<i>0.000***</i>
Median Diff. UK	-0.0509	-0.0315	-0.0269
Median Diff. US	-0.0803	-0.0388	-0.0397
# Obs. - UK	188	278	523
# Obs. - US	1,584	1,306	1,349
Beta	[US LOWER]	[US LOWER]	[US HIGHER]
<i>p-value</i>	<i>0.016**</i>	<i>0.589</i>	<i>0.793</i>
Median Diff. UK	0.2819	0.4361	0.3128
Median Diff. US	0.0401	0.4126	0.3470
# Obs. - UK	188	278	523
# Obs. - US	1,584	1,306	1,349
RMSE	[US LOWER]	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.004***</i>	<i>0.047**</i>	<i>0.000***</i>
Median Diff. UK	-0.0486	-0.0330	-0.0272
Median Diff. US	-0.0749	-0.0381	-0.0388
# Obs. - UK	188	278	523
# Obs. - US	1,584	1,306	1,349

Table 6 Panel B: Changes in Stock-Based Measures of Risk – By R&D Group

Panel B compares the changes in the stock-based measures of risk between the post-SOX 2003-2006 and pre-SOX 1994-1997 periods in US firms to the changes in UK firms for each of the three R&D groups. The variables of interest are firm level differences in monthly standard deviation of returns (STD of Returns) between the periods, and firm level differences in the market model estimates of beta (Beta) and the root mean square error (RMSE) between the periods. For each firm we calculate the difference in the mean value of the variable between the early period and the later period. A negative difference indicates the variable declined in the post-SOX period. We then compare the distributions of differences of U.S. and U.K. firms for each R&D group using Wilcoxon rank sum tests. The bracketed terms describe whether the U.S. differences were higher or lower than expected relative to the U.K. differences based on the sum of scores. The p-values for the significance of the tests are in italics. The median difference for each country and the number of observations for each country are also tabulated. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

	High R&D	Mod. R&D	Low R&D
STD of Returns	[US LOWER]	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.000***</i>	<i>0.322</i>	<i>0.046**</i>
Median Diff. UK	0.0112	0.0018	0.0015
Median Diff. US	-0.0116	0.0004	-0.0020
# Obs. - UK	118	224	374
# Obs. - US	790	799	789
Beta	[US LOWER]	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.005***</i>	<i>0.014**</i>	<i>0.824</i>
Median Diff. UK	1.0244	0.6270	0.4893
Median Diff. US	0.6536	0.5369	0.4991
# Obs. - UK	118	224	374
# Obs. - US	790	799	789
RMSE	[US LOWER]	[US LOWER]	[US LOWER]
<i>p-value</i>	<i>0.000***</i>	<i>0.418</i>	<i>0.113</i>
Median Diff. UK	0.0091	0.0012	-0.0019
Median Diff. US	-0.0153	-0.0012	-0.0042
# Obs. - UK	118	224	374
# Obs. - US	790	799	789

Table 7: Proceeds for Firms Going Public in the U.K. vs. the U.S.

This table presents total proceeds in millions of end-of-year 2005 CPI-adjusted U.S. dollars. The sample includes 9,262 IPOs from 1990 through 2006.

Panel A: U.S. IPOs	1990-2006	Pre SOX (1990-2002)			Post SOX (2003-2006)				
	All Deals	All Deals	High R&D	Mod. R&D	Low R&D	All Deals	High R&D	Mod. R&D	Low R&D
Number of IPOs	7,380	6,417	2,472	1,444	2,501	963	283	179	501
Sum of Proceeds in Million of U.S. Dollars	911,126	680,840	229,088	188,233	263,519	230,286	39,259	42,418	148,609
Mean Proceeds in Million of U.S. Dollars	123	106	93	130	105	239	139	237	297
Median Proceeds in Million of U.S. Dollars	41	35	32	33	43	122	72	135	173
Panel B: U.K. IPOs	1990-2006	Pre SOX (1990-2002)			Post SOX (2003-2006)				
	All Deals	All Deals	High R&D	Mod. R&D	Low R&D	All Deals	High R&D	Mod. R&D	Low R&D
Number of IPOs	1,882	1,284	314	287	683	598	154	153	291
Sum of Proceeds in Million of U.S. Dollars	186,326	147,639	14,690	45,746	87,203	38,687	4,484	18,691	15,512
Mean Proceeds in Million of U.S. Dollars	99	115	47	159	128	65	29	122	53
Median Proceeds in Million of U.S. Dollars	14	17	13	16	20	10	11	11	9

Table 8: Logistic Regression of Going Public in the U.K. vs. the U.S.

This table presents a logistic regression that models the occurrence of an IPO in the U.K. vs. the U.S. The sample includes 9,258 IPOs from 1990 through 2006. There are 1,878 U.K. IPOs and 7,380 U.S. IPOs. The dependent variable is 1 for U.K. IPOs and 0 for U.S. IPOs. The logit model estimates the probability of a U.K. IPO. Log of Proceeds is the natural log of the total proceeds in millions of end-of-year 2005 CPI-adjusted U.S. dollars. Top R&D Group is equal to 1 for IPOs in the Top R&D group. Mid R&D Group is equal to 1 for IPOs in the Mid R&D group. Post SOX is equal to 1 for IPOs taking place after 2002 or from 2003 through 2006. P-values refer to t-tests of parameter estimates equal to zero. ***, **, * Significant at the one, five, and ten percent levels, respectively.

	Parameter Estimate	Standard Error	P-value
Intercept	0.460	0.076	0.0001***
Log of Proceeds in Million of U.S. Dollars	-0.543	0.020	0.0001***
High R&D Group	-0.865	0.077	0.0001***
Mod. R&D Group	-0.423	0.082	0.0001***
Post SOX	1.138	0.096	0.0001***
High R&D Group * Post SOX	0.542	0.156	0.0005***
Mod. R&D Group * Post SOX	0.707	0.169	0.0001***
Correct predictions	72.5%		
Number of observations	9,258		