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The Impact of the Sarbanes-Oxley Act on the Cost of Going Public

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Abstract
This paper examines the impact of the Sarbanes-Oxley Act (SOX), a legal framework intended to increase transparency and accountability of listed companies, on the cost of going public in the US. We expect SOX to increase the direct cost of going public, but decrease the underpricing because of reduced asymmetric information. Our main results corroborate these hypotheses. First, we find an increase in the cost of going public of 90 bp of gross proceeds. Second, we record a reduction in underpricing of 6 pp, which is related to a reduced offer price adjustment. This supports our hypothesis that SOX represents a mechanism to reduce asymmetric information.

JEL-Classification: G18, G24, G32

Keywords: asymmetric information, auditing and legal fees, bookbuilding, IPO, flotation cost, going public, partial adjustment phenomenon, propensity score matching, selection bias, SOX, underpricing, underwriting fees

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1 Introduction

It is commonly agreed that the enactment of the Sarbanes-Oxley Act (SOX) in 2002 imposed substantial additional regulatory cost on publicly traded firms in the US. This, however, gives no indication of the sign of the welfare effects of SOX. In fact, it might well be that the benefits of increased transparency, reliability, and accountability in the corporate sector altogether outweigh the additional cost of compliance. For the time being, the empirical literature regarding the market's reaction to the introduction of SOX is still inconclusive (for an overview see Coates 2007). Some papers documented effects that are in accordance with the view that, overall, the cost of capital should have decreased. For instance, Jain, Kim, and Rezaee (2006) showed that market liquidity improves after the enactment of SOX. Jain and Rezaee (2006), Li, Pincus, and Rego (2008), and Chhaochharia and Grinstein (2007) documented positive abnormal returns over periods surrounding rulemaking events.

However, other papers indicated that the net wealth effect of SOX might be negative. By comparing stock price movements of foreign firms with US-based firms, Zhang (2007) deduced that the costs of SOX largely outweigh their benefits. Also, Engel, Hayes, and Wang (2007) documented negative market reactions, which are most pronounced for smaller firms. Wintoki (2007) found an effect on firm value, although he showed that price reactions depend on firm characteristics related to its corporate governance setup. Litvak (2007) found that cross-listing premiums of foreign issuers have declined after the introduction of SOX. Evidence quoted by Carney (2006) indicated that premiums of D&O insurance have increased substantially after the enactment of SOX, and he furthermore presented evidence of an increasing tendency towards exiting the public market in the US (i.e., going private). Kamar, Pinar, and Talley (2007) calculated that for smaller listed firms, it has become more likely to be sold to private investors.

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Research regarding the impact of SOX on the US IPO market is scant. Bargeron, Lehn, and Zutter (2010) showed that the likelihood of undertaking an IPO in the US has decreased compared to the likelihood of undertaking the IPO in the UK, and Leon (2006) showed that the US has lost its market share in global equity offerings. Both papers, however, argue that their findings are the result of what companies have to expect to fulfill when being public. In this sense, the question of whether the provisions of SOX also materialize in the IPO conditions has not yet been addressed, at least to our knowledge. We think, however, that this is an important issue, as SOX claims to improve transparency, reliability, and accountability in listed firms. If this is the case, SOX should have an impact on information production for firms aiming to go public. And corporate practitioners as well as regulators have to understand this relationship.

This paper intends to fill this gap by examining whether SOX has had an impact on the pricing of IPOs in the US. We approach this issue by looking at the direct as well as the indirect costs of going public, and this for two reasons: First, if SOX has an impact on information quality, this should be reflected in the cost of information production, i.e. in the direct cost of going public, as was also shown by Hanley and Hoberg (2010).

Second, it is well known that the degree of asymmetric information among issuers, underwriters, and/or investors is believed to be one of the major factors in determining underpricing. Ritter and Welch (2002: 1807) pointed out that "all theories of underpricing based on asymmetric information share the prediction that underpricing is positively related to the degree of asymmetric information". In fact, in a recent paper, Hanley and Hoberg (2010) showed in the context of a word content analysis of IPO prospectuses that greater informative content results in more accurate pricing, i.e. a reduced offer price adjustment, and less underpricing. They argued that information revelation by issuers can serve as a substitute for costly bookbuilding.

In this paper, we follow a similar approach by focusing on models assuming that institutional investors are better informed than underwriters. In these models, the degree of asymmetric information impacts the outcome of the bookbuilding process. According to Benveniste and Spindt (1989), lead investment banks underprice IPOs as a reward to institutional investors for truthfully revealing their private (and costly) information. Hence, the private information revealed during the bookbuilding phase is only partially integrated into the offer price. Hanley (1993) first documented this partial adjustment phenomenon, showing that there is a strong positive correlation between the offer price adjustment (relative to the price range in the pre-filing period) and the final underpricing.

Starting from these considerations, we hypothesize SOX to have reduced the level of asymmetric information between the underwriter and the investor. Consequently, the level of underpricing should have decreased after the introduction of SOX. Moreover, the reduction in underpricing should go along with a reduction in the offer price adjustment.

In order to test our hypotheses, we conduct an empirical analysis of 3,974 US IPOs during the period 1990 to 2007. With respect to the analysis of the direct costs, we restrict this sample to the period 1998 to 2007, i.e. 1,116 IPOs, as flotation costs are not subject to similar extreme and perennial cycles to those underpricing is (Kaserer and Kraft 2003). One major problem in this paper is how to disentangle the influence coming from the SOX enactment from influences coming from other risk factors, e.g., the economic downturn experienced during the period 2001 to 2003, the increased risk premiums in the aftermath of the 9/11 event, etc. We address this caveat common to most SOX-related research (Leuz 2007) by employing a propensity score matching approach. Although we cannot rule out that our results are nevertheless affected by a self-selection bias, our findings seem to be pretty stable with respect to several robustness tests addressing this issue.

Our main findings can be summarized as follows: First, we find a statistically highly significant increase in the cost of going public of about 90 basis points (bp) of gross proceeds. This increase is almost entirely due to an increase in accounting and legal fees, while the underwriting fees are almost unaffected by SOX. Second, we show that the increase in flotation costs is to a large extent an increase in fixed costs. Specifically, for firms with proceeds of up to $100 million, the increase is relatively stable at 0.5 million dollars in the year 2000. Hence, SOX has had a substantial impact on flotation costs for small firms, while the effect seems to be negligible for larger firms.

Third, we document a statistically and economically significant negative impact of SOX on underpricing

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in the range of 5 to 6 percentage points (pp). This effect is substantially stronger than the increase in the direct cost of going public. Moreover, we present evidence corroborating the perception that the enactment of SOX has led to a permanent structural break in the underpricing function. Fourth, we find the reduction in underpricing to be driven by a reduction in the offer price adjustment, which is supporting evidence for the notion that SOX has helped to reduce information asymmetries between the issuer/underwriter and the investor.

Fifth, we show that our results are not driven by a selection bias due to a changing composition of the IPO firms after SOX. For that purpose, we test the robustness of our results on the basis of a matched sample approach.

An important implication of our findings is that they are in accordance with the view that SOX has had an impact on information distribution at the IPO stage. By effectively reducing the degree of asymmetric information, it might have had a positive impact on the corporate cost of capital, even though a part of these savings is consumed by a higher direct cost of going public. However, we do not deliver an overall picture of the impact of SOX, as we do not consider the cost of being public here.

The paper is organized as follows: section 2 briefly discusses the Sarbanes-Oxley Act of 2002, while section 3 lays down the hypotheses of why SOX should have an impact on IPO pricing. In section 4, we describe the dataset and section 5 presents the results. Section 6 summarizes the main findings and gives a conclusion.

2 Relevant aspects of the Sarbanes-Oxley Act of 2002

The main intention of SOX was to improve transparency in public companies by enhancing disclosure and monitoring requirements, preventing gatekeeper failure, and improving risk management systems. With this agenda, SOX was the direct response to a number of accounting scandals in 2000 and 2001, with Enron being the most prominent example. The Act tries to disengage both legal and illegal activities, which prevent the investor from proficiently valuing a company. Earnings management or window dressing could be mentioned as legal activities, while manipulation of accounting information or concealment of material information could be regarded as illegal activities.

The rules on financial disclosures require public companies – among other things – to inform about off-balance-sheet transactions and to provide pro-forma balance sheets. The enhanced disclosure rules should substantially increase publicly available information and, thus, improve the transparency of public companies. The provisions on internal controls (Section 404) require public companies to thoroughly disclose risks and to report on their disclosure controls and procedures – a burdensome requirement, which has been blamed most for consuming enormous organizational resources.

Its widely extended monitoring requirements are another focal point of SOX. The Act obliges auditors to assess and audit the internal control structures. New internal controls are defined by the Act (Section 404) and range from internal monitoring systems of operating performance and internal liabilities to an independent audit committee. The whistleblower regulations of Section 806 are another form of monitoring, making executives subject to scrutiny by their subordinates.

SOX also introduces a set of measures to regulate gatekeepers in order to enforce its monitoring requirements. Ribstein (2005: 5 et seq.) defined gatekeepers as "senior executives, independent directors, large auditing firms, outside lawyers, securities analysts, the financial media and debt rating agencies". The accounting scandals in the early 2000s showed that the gatekeepers in place failed to do their jobs, often caused by conflicts of interest. As a consequence, the Public Company Accounting Oversight Board (PCAOB) is a major innovation brought about by SOX. The Board is a completely new independent institution regulating audit companies and defining audit standards. In order to avoid potential conflicts of interest, audit companies are prevented from cross-selling services to their audited companies. The same is true for investment banks that have to separate their research on underwritten companies from the capital markets team. By ruling out potential conflicts of interest, investors can be assured that gatekeepers provide fair assessments of the financial condition of companies going or already being public. In particular, the problem of analysts overstating the value of a company trying to go public is addressed, and many forms of influencing the analysts' opinion have been outlawed by SOX. Overall, the pressure on gatekeepers to perform a fair and objective job has substantially increased.

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It is, thus, not surprising that Eldrige and Kealy (2005) found an average increase in audit fees from 2003 to 2004 of $2.3 million. Furthermore, they found that SOX audit costs increase with size, but that the SOX audit unit costs vary inversely with size, which indicates that large companies are able to benefit from economies of scale. Carney (2006) found the increase of accounting and legal fees to be 62 percent on average since January, 2004.

3 SOX and the cost of going public

3.1 Direct costs of going public

Ritter (1987) and Lee, Lochhead, Ritter, and Zhao (1996) separated the total costs of going public into direct costs (underwriting fee plus other expenses related to the offering) and indirect costs (underpricing). The most important direct cost component in an IPO is the underwriting fee (also called gross spread), which the issuer has to pay to the underwriting syndicate. Chen and Ritter (2000) documented a pronounced clustering of underwriting fees at 7 percent, leading them to coin this phenomenon as the "7-percent rule". In other markets, however, clustering seems to be less present, as has been documented by Torstila (2003) or Kaserer and Kraft (2003). Hansen (2001) examined the question of whether this 7-percent rule is the result of collusion among underwriters. The author did not find supporting evidence in favor of the collusion theory. In contrast, he suggested the 7-percent contract to be "an efficient innovation that better suits the IPO", while competition would rather take place on reputation, placement service, and underpricing.

The ex-ante expected net effect of SOX on the underwriting fee seems ambiguous. On one side, it could be argued that having to make a firm SOX-compliant is a challenge that affects the services offered by the underwriter and, therefore, makes them costlier. On the other side, however, legal responsibility is shared among more players after SOX, and the degree of asymmetric information between the issuer and the underwriter may be reduced as well, which should have a mitigating impact on underwriting fees. In fact, Kaserer and Kraft (2003) documented that underwriting fees increase monotonically with the degree of complexity in an IPO, and that underwriting fees are significantly lower for less volatile stocks. Overall, we do not have a clear prediction of the impact of SOX on the net effect on the underwriting fees. Regarding the findings of Hansen (2001), it is also likely that underwriter fees remain completely unchanged.

The remaining direct costs include other non-underwriting fees like all remaining costs related to the offering such as exchange listing and SEC registration fees, printing and marketing expenses and accounting and legal fees. The introduction of SOX should have affected these cost components in at least two ways: higher compliance costs in general and additional costs associated with the implementation of SOX. Compliance costs primarily result from additional disclosure and monitoring requirements. Accounting and legal fees are expected to increase substantially as the responsibilities of audit companies have been widely extended. Retaining work papers and peer reviews for seven years and auditing the internal monitoring systems of public companies are just a few of the additional responsibilities of auditors. Furthermore, audit companies face additional costs for funding the Public Company Accounting Oversight Board (PCAOB) and annual quality reviews, which they pass on to their clients. Changing auditors every five years is another costly requirement. Although most of these cost items tend to increase the firm's cost of being public, they will most likely also have an impact on the cost of going public, as on that occasion auditing mechanisms have to be implemented for the first time. Overall, we would therefore expect the non-underwriting direct costs of going public to have increased in the after-SOX era.

3.2 Indirect costs of going public

As already pointed out, the main reason why SOX is expected to have a dampening impact on the degree of asymmetric information is because of its goal of improving transparency in public companies, preventing gatekeeper failure, and improving risk management systems.

Therefore, we expect the introduction of SOX to have increased the amount and quality of publicly available information at the IPO stage, which is relevant to both underwriters and investors. As a consequence, the degree of asymmetric information should have been reduced, and this should have an impact on underpricing. In fact, according to the literature, the degree of asymmetric information among issuers, underwriters, and/or investors is believed to be one of the major factors in determining underpricing (Ritter and Welch 2002). Perti-

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nent empirical evidence in this regard was presented, among others, by Muscarella and Vetsuypens (1989), Ang and Brau (2002), and Hanley and Hoberg (2010).

However, the channel by which asymmetric information impacts underpricing varies among different models. Some of these models build on the fact that underwriters are better informed than issuers (e.g., Baron 1982, Loughran and Ritter 2002), while others start from the presumption that the issuer is better informed about the true state of the firm than the investor (e.g., Allen and Faulhaber 1989, Grinblatt and Hwang 1989, Welch 1989). Finally, and most importantly in the context of this paper, there are several models assuming that institutional investors are better informed than underwriters (e.g., Benveniste and Spindt 1989, Benveniste and Wilhelm 1990, Spatt and Srivastava 1991). In these models, the degree of asymmetric information impacts the outcome of the bookbuilding process. According to Benveniste and Spindt (1989), lead investment banks underprice IPOs as a reward to investors for truthfully revealing their private (and costly) information. Hence, the private information revealed during the bookbuilding phase is only partially integrated into the offer price. While the degree of partial adjustment generally depends on the bargaining power of the institutional investor, it is an important prediction within these models that underpricing is positively related to the value of the institutional investor's private information (Benveniste and Spindt 1989 and Sherman and Titman 2002), which in turn depends on the degree of asymmetric information between the bookrunner and the investor. Hanley (1993) first documented this partial adjustment phenomenon, which is characterized by a strong positive correlation between the offer price adjustment and the final underpricing. More recent evidence can be found in Ljungqvist and Wilhelm (2003), Lowry and Schwert (2002), Loughran and Ritter (2002), Benveniste, Ljungqvist, Wilhelm, and Yu (2003), and Lowry and Schwert (2004). Cornelli and Goldreich (2003: 1415) found pertinent evidence "for the view that bookbuilding is designed to extract information from investors".

One important prediction in these models is that the degree of underpricing is related to the value of private information of those institutional investors participating in the bookbuilding process. If there were no information asymmetries between the different participating investors, there would be no necessity to underprice an issue. Hence, underpricing reflects a cost of capital component due to the presence of asymmetric information. As a consequence, if a firm or the regulator was able to reduce the degree of asymmetric information, a decrease (increase) in underpricing (the cost of capital) would result. This is the starting point of our hypothesis predicting that SOX should dampen underpricing, as we expect SOX to have an impact on the degree of asymmetric information on the stock market.

Interesting evidence supporting these models was added in a recent paper by Hanley and Hoberg (2010). In the context of a word content analysis of IPO prospectuses, they showed that greater informative content results in a reduced offer price adjustment and less underpricing. They argued that information revelation by issuers reduces the need for information generated during bookbuilding and, hence, makes bookbuilding less costly.

However, the above-mentioned models generate a second prediction as the channel via which reduced information asymmetry influences underpricing is the way in which the bookbuilding range is fixed. If SOX alleviates the information advantage of institutional investors participating in the bookbuilding, there should be less necessity for (partially) adjusting the offer price range during the bookbuilding phase. As a consequence, the difference between the final offer price and the midpoint of the initial (prefiling) bookbuilding range should be smaller, i.e. SOX should have a dampening impact on the partial adjustment phenomenon.

As a final remark, it should be noted that SOX could also have an impact on underpricing via its impact on litigation risk. The pertinent literature shows that ex-ante litigation risk is positively related to underpricing (e.g., Lowry and Shu 2002, Tiniç 1988). However, the predictions coming from this strand of literature with respect to the impact of SOX are ambiguous, as it is not clear whether ex-ante litigation risk has increased.

4 Data

Our database integrates data from SDC and Datastream and covers an 18-year period from January, 1990 to December, 2007. We eliminate all financial and real estate companies, foreign issuers, ADRs, ADSs, and offerings with an offer price of less

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than five dollars. We exclude one observation where the underpricing seems extraordinarily high, and we were not able to verify the values reported in SDC. This leaves a total of 3,974 bookbuilding IPOs including unit and tranche offerings. As we do not have all information available for each observation, the numbers of observations included into various analyses vary.

Most of the company-specific data come from Thomson's Securities Data Company's (SDC) New Issues database: Offer price, first trading day closing price, proceeds raised, number of primary and secondary shares issued, and all data concerning the bookbuilding process such as range prices and range revisions. The numbers from Thomson are cross-checked with general IPO data provided by the NASDAQ website which provides information about all IPOs taking place in the US. Information on stock market returns and indices are taken from Datastream. The information on underwriting fees and other expenses such as legal and accounting fees are hand-collected from the registration statement S1 as filed with the SEC.

All monetary values are stated in dollars and converted to purchasing prices of the year 2000 using the CPI (CPI=100 in 2000) in order to control for inflation. Underpricing is defined as the first trading day return, i.e. the return from buying the stock at the offer price and selling at the first trading day price. The offer price adjustment is calculated as the relative difference between the offer price and the midpoint of the initially (pre-filing period) filed bookbuilding range. The data on company founding dates come from the Field-Ritter dataset of company founding dates. The age of a company is denoted in years and calculated as the difference between the founding and issuing date. To rank each underwriter, we use Loughran and Ritter's updated measures of Carter and Manaster's (1990) underwriter quality. Ranks range from zero to nine, with higher ranks representing higher-quality underwriters. For the empirical analysis, we use a reputation dummy, which is coded 1 in case of a rank of at least 8, and 0 otherwise. Loughran and Ritter (2004) used a similar measure for controlling for underwriter reputation in their regression analysis of underpricing. We have also run the regression analysis with the actual reputation values or with a separate dummy for each rank. Similar results regarding the coefficient of the SOX dummy variable are delivered. However, in the first case, the explanatory power of the model decreases slightly.

Overhang is defined as pre-IPO shares retained divided by shares issued in the IPO. Firms with greater overhang suffer less dilution, meaning the costs of underpricing are lower and the level of underpricing is likely to be greater (Bradley and Jordan 2002).

Moreover, we classify firms into several industry groupings. Firms that SDC defines as belonging to the high-tech industry are classified as technology firms. Firms that are furthermore defined as providing "Internet Software and Services" are classified as Internet firms.

Finally, it should be noted that we perform the analysis of the change in the direct cost of going public on a reduced sample, i.e. the subsample of all IPOs taking place during the period 1998 to 2007. Ideally, when analyzing the impact of a given regulatory action, a relatively short pre- and post-action period should be considered in order to prevent other structural breaks to have an impact on the results. A period of ±5 years covering a total of 1,116 IPOs might be acceptable in this regard. However, as far as the analysis of the underpricing is concerned, IPO market cycles have to be taken into account. In order to include hot and cold IPO markets in the pre- as well as in the post-action period, we decided to extend the event period back to the year 1990.

5 Empirical results

5.1 Analysis of the direct costs

5.1.1 Descriptive statistics

Table 1 reports descriptive statistics for the subsample used for the analysis of direct costs. On average, a company going public during the period 1998 to 2007 had to pay 9.28 percent of its gross proceeds for underwriting and non-underwriting fees. The major part of the total direct costs (6.84 percent) is paid to the underwriting syndicate. The mean non-underwriting expenses are equal to 2.43 percent, with accounting and legal fees making up 65 percent of all non-underwriting expenses. The median IPO incurs costs of 8.96 percent. The median underwriting fees are exactly 7 percent; in almost 80 percent of all issues the underwriting fee was exactly equal to this figure. The median non-underwriting expenses are lower than the average ones, summing up to 2.00 percent.

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Table 1: Descriptive statistics, 1998 – 2007

	Mean	Std. Dev.	Median
Number of observations		1116	
Total Direct Costs	9.28%	2.18%	8.96%
Underwriting fees	6.84%	0.58%	7.00%
Non-underwriting fees	2.44%	1.95%	2.00%
Accounting & legal fees	1.55%	1.27%	1.23%
Gross Proceeds (2000 $mil)	147.0	400.7	73.5
Assets before IPO (2000 $mil)	441.1	2067.7	64.4
Ratio of Primary Shares	90.6%	21.3%	100.0%
Age of Company (years)	15.0	22.1	7.0
% NASDAQ IPOs		82.1%	
% Venture-capital-backed IPOs		55.6%	
% IPOs of Technology Firms		39.2%	

Notes: Data are collected from Thomson's SDC platinum database. All cost items are expressed as a percentage of gross proceeds. Both gross proceeds and assets are adjusted to purchasing prices of 2000 and denoted in millions of dollars. The period before SOX includes IPOs between 1998 and 2002. The period after SOX includes IPOs between 2003 and 2007. Ratio of primary shares denotes the ratio of primary shares to all shares issued. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. Percentage of venture-capital-backed equals the percentage of IPOs that were backed by venture capitalists before the IPO. Firms that SDC defines as belonging to a high-tech industry are classified as technology firms.

Table 2 presents descriptive statistics on the pre-SOX (Panel B) and post-SOX (Panel A) periods. Panel C reports the percentage changes in means and medians as well as their statistical significance. Remarkably, almost all variables are significantly different between the pre- and post SOX-period. According to our sample, the total direct costs have on average increased by a statistically significant, but economically rather moderate 33 bp to 9.51 percent of gross proceeds. Meanwhile, the fees paid to the underwriting syndicate are equal to 7.00 percent in the median both before and after the introduction of SOX. On average, we report a significant reduction in underwriting fees of 12 bp. However, as the median IPO has been significantly larger after the introduction of SOX, the findings might be simply driven by scale effects inherent in the underwriting fees. Mean non-underwriting fees, which comprise all other expenses related to the offering, have increased by 46 bp or about 20 percent; there has been a similar increase in the median. The increase in accounting and legal fees, which are a part of the non-underwriting fees, is even stronger. Here the increase ranges between 51 and 41 bp or 35 percent and 37 percent, respectively, depending on whether one looks at the mean or median. The firm-specific characteristics have changed even more dramatically. While the median (average) gross proceeds have increased by 23.08 percent (+2.95 percent) to $69.39 ($149.95) million, median (average) assets before the IPO more than doubled (+24.11 percent). The median (average) company age has increased by exactly 50 percent (+76.00 percent) from six to nine (21.2) years. The market share of NASDAQ venture-capital-backed IPOs and high-technology firms has decreased significantly after the introduction of SOX, which indicates that the composition of the IPO market has been changed substantially by the introduction of SOX. These findings furthermore suggest that the degree of risk inherent in the IPO market has strongly declined in the aftermath of SOX. Apparently, small and rather risky companies tend to refrain from going public.

5.1.2 Modeling the direct costs of going public

In order to isolate the impact of SOX on the results reported in the preceding subsection, we set up a linear regression model. From previous literature, it is known that gross proceeds are the most powerful determinant of the direct costs of going public (Altinkiliç and Hansen 2000, Kaserer and Kraft 2003, Torstila 2003). There are several suggestions about the functional form in which proceeds should be used to explain the direct costs. Torstila (2003) used the natural logarithm of gross proceeds in order to explain scale effects of the offering size on the underwriting fees. In contrast, Kaserer and Kraft (2003) applied a quadratic cost function on a similar problem in order to capture the fixed-cost effect in the direct cost function. However, these approaches focus on the analysis of the underwriting fees, while in this paper we look also at non-underwriting fees. Thus, in order to identify the most appropriate cost function, we initially run simple linear regression models with gross proceeds as the only explanatory variable. Table 3 reports the results of these regressions in terms of R2 and F-statistics. It can be seen that the most powerful specification is the quadratic cost function as proposed by Kaserer and Kraft (2003). Here, however, multicollinearity might come up as an issue. Therefore, we will use gross proceeds as an explanatory variable for the underwriting fees, and the inverse of gross proceeds for all other cost items. According to Table 3, we do not lose much explanatory power by doing so, but we eliminate any multicollinearity issue from our analysis. In fact, all VIF factors are lower than 5 in our analysis.

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Table 2: Comparison of the pre- and post-SOX periods

	Panel A 2003 - 2007		Panel B 1998 - 2002		Panel C change in %	
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**
Number of observations	354		762			
Total Direct Costs	9.51%	9.16%	9.18%	8.88%	3.60% ***	3.16% ***
Underwriting fees	6.76%	7.00%	6.88%	7.00%	-1.87% ***	0.00%
Non-underwriting fees	2.75%	2.24%	2.29%	1.89%	20.02% ***	18.77% ***
Accounting & legal fees	1.90%	1.54%	1.39%	1.13%	36.94% ***	35.75% ***
Gross Proceeds (2000 $mil)	149.9	85.4	145.7	69.4	2.95% ***	23.08% ***
Assets before IPO (2000 $mil)	508.5	118.2	409.7	51.8	24.11% ***	128.20% ***
Ratio of Primary Shares	84.0%	100.0%	93.7%	100.0%	-10.3% ***	0.0%
Age of Company (years)	21.2	9.0	12.1	6.0	76.0% ***	50.0% ***
% NASDAQ IPOs	70.4%		87.3%		-19.4% ***	
% Venture-capital-backed IPOs	47.4%		59.5%		-20.4% ***	
% IPOs of Technology Firms	23.8%		46.2%		-48.4% ***	

*Notes: Data are collected from Thomson's SDC platinum database. All cost items are expressed as a percentage of gross proceeds. Both gross proceeds and assets are adjusted to purchasing prices of 2000 and denoted in millions of dollars. The period before SOX includes IPOs between 1998 and 2002. The period after SOX includes IPOs between 2003 and 2007. Ratio of primary shares denotes the ratio of primary shares to all shares emitted. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. Percentage NASDAQ resp. percentage venture-capital-backed equals the percent of IPOs that were listed at NASDAQ resp. backed by venture capitalists before the IPO. Firms that SDC defines as belonging to a high-tech industry are classified as technology firms. Percentage IPOs of Technology Firms gives the percentage of these firms in the sample. A two sample Gauss test is used here to examine whether the mean results are statistically significantly different from each other. The difference of medians is tested by using the Mann-Whitney test. ***, **, * denote significance at the 1, 5, and 10% levels.*

Table 3: Choosing a functional form of gross proceeds explaining the direct costs and its components

	P*	1 / P*	LN(P*)	r-squared	F-statistic
Total direct costs	x			14.0%	15.2
		x		54.3%	283.2
			x	36.4%	287.0
	x	x		**57.3%**	**175.0**
Underwriting fees	x			42.4%	24.8
		x		14.8%	104.7
			x	**36.9%**	**151.3**
	x	x		**46.6%**	**71.6**
Non-underwriting fees	x			5.0%	10.5
		x		50.5%	244.4
			x	**24.3%**	**190.5**
	x	x		**50.5%**	**494.1**
Accounting and legal fees	x			4.8%	10.6
		x		36.1%	185.3
			x	**20.4%**	**203.6**
	x	x		**36.4%**	**157.9**

* Proceeds

Notes: Data are collected from Thomson's SDC platinum database. P represent the gross proceeds that are adjusted to the purchasing prices of 2000 and denoted in millions of dollars. The results are based on estimates of a simple linear regression with the direct costs or a cost component as the dependent variable. All costs are expressed in percent of gross proceeds. The regression model includes a constant and the independent variable P* in a functional form as indicated on the table. The F-statistic is based on standard errors corrected by White's (1980) method in order to correct for heteroskedasticity.*

Furthermore, we include the following control variables. As an additional measure of IPO size, we use the assets of the company before the IPO in millions of dollars and adjusted to purchasing prices of 2000. In line with suggestions in the literature, we also use the ratio of primary shares to all shares issued as an additional explanatory variable (e.g., Altinkiliç and Hansen 2000, Kaserer and Kraft 2003). In order to see impact on costs, we furthermore integrate the age of the company going public. For the same purpose, we include a dummy variable indicating high-technology IPOs. We also introduce a dummy variable for the NASDAQ exchange to determine whether the listing venue affects the costs of going public. Furthermore, we employ two additional dummy variables for underwriter reputation

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and venture-backed IPOs to determine whether IPO stakeholders influence the direct costs of an IPO. Finally, SOX is a dummy variable set to 1 if the IPO took place between 2003 and 2007.

Table 4 documents the OLS estimation results where total direct flotation costs (Panel A), underwriting fees (Panel B), non-underwriting fees (Panel C), as well as accounting and legal fees (Panel D) are used as the dependent variables. Due to the presence of heteroskedasticity, we apply White's (1980) heteroskedasticity-consistent standard errors method for the variance of the least-squares estimator and calculate the t-statistics for the coefficients accordingly. It is worth noting that the model has high explanatory power, as in all cases the R2 is between 45 percent and 61 percent.

The regression model in Panel A of Table 4 gives the results with respect to total direct costs. As the most important finding in the context of this paper, we note that the SOX dummy documents a highly significant increase in costs of 89 bp. As expected, the inverse of gross proceeds is the most powerful explanatory variable in the model.

Table 4: Basic regression analysis of total direct costs

	Panel A		Panel B		Panel C		Panel D	
	Total Direct Costs		**Underwriting Fees**		**Non-underwriting Fees**		**Accounting and Legal Fees**	
	Coeff.	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**
Intercept	0.065 ***		0.067 ***		0.001		0.001	
	19.8		*50.5*		*0.3*		*0.2*	
IPO Proceeds			-8.8E-06 ***	5.3				
			-4.2					
1 / (IPO Proceeds)	1.274 ***	1.5			1.180 ***	1.5	0.647 ***	1.5
	14.0				*14.4*		*12.6*	
Assets before IPO	-1.5E-06 ***	1.2	2.1E-07	5.2	-1.9E-07	1.2	-1.7E-07	1.2
	-3.6		*0.4*		*-1.5*		*-1.5*	
LN(AGE)	-0.001 **	1.3	-2.3E-04	1.3	-0.001 *	1.3	-0.001 **	1.3
	-2.1		*-1.3*		*-1.8*		*-2.2*	
Ratio of Primary Shares	0.009 ***	1.2	0.001	1.3	0.007 ***	1.2	0.005 ***	1.2
	4.3		*0.5*		*4.7*		*4.5*	
NASDAQ (dummy)	2.4E-04	1.6	0.003 ***	1.5	-0.002 *	1.6	0.000	1.6
	0.2		*5.6*		*-1.9*		*-0.2*	
Technology firm (dummy)	0.000	1.2	4.4E-04 **	1.2	0.000	1.2	0.000	1.2
	0.0		*2.0*		*-0.5*		*-0.3*	
Venture-backing (dummy)	-0.002	1.4	0.001 **	1.4	-0.002 **	1.4	-0.001 *	1.4
	-1.6		*2.1*		*-2.2*		*-1.8*	
Underwriter rank (dummy)	0.001	1.3	-0.001 ***	1.1	0.001	1.3	0.001	1.3
	0.9		*-3.1*		*1.0*		*0.8*	
Transition-year (dummy)	0.007 ***	1.1	0.002 ***	1.1	0.005 ***	1.1	0.004 ***	1.1
	4.2		*3.5*		*3.2*		*3.4*	
SOX (dummy)	**0.009** ***	1.2	-3.4E-04	1.2	0.009 ***	1.2	0.008 ***	1.2
	8.7		*-1.0*		*9.1*		*11.5*	
F-statistic	53.5		24.3		46.6		40.2	
R-squared	0.605		0.495		0.560		0.454	
Condition Index	20.8		20.2		20.8		20.8	
Number of observations	1116		1116		1116		1116	

*Notes: Data are collected from Thomson's SDC platinum database. The sample consists of 1,116 firms that went public between 1998 and 2007. IPO proceeds equal the amount of money raised in the IPO (excl. greenshoe), in year 2000 millions of dollars. Assets before the IPO equal the total assets of the firm before the IPO, in year 2000 millions of dollars. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. Ratio of primary shares denotes the ratio of primary shares to all shares issued. NASDAQ is a dummy variable indicating IPOs that went public on the NASDAQ stock exchange. Firms that SDC defines as belonging to a high-technology industry are classified as technology firms. Underwriter rank is a measure of the quality of the underwriter, with the minimum rank being zero and the maximum being nine, according to Loughran and Ritter's updated measures of the Carter and Manaster rankings. Transition-year is a dummy variable set to 1 in case of the IPO taking place in 2002. SOX is a dummy variable set to 1 in case of the IPO taking place after 2002. White heteroskedasticity robust t-statistics are shown in italics. ***, **, * denote significance at the 1, 5, and 10% levels. Condition Index states the highest number of the respective index.*

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Table 5: Basic and matched sample regression analysis of non-underwriting fees and accounting and legal fees

	Panel A		Panel B		Panel C		Panel D	
	Total Direct Costs		**Underwriting Fees**		**Non-underwriting Fees**		**Accounting and Legal Fees**	
	Coeff.	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**
Intercept	0.006 **		0.003		0.005 **		0.001	
	2.1		*0.9*		*2.3*		*0.6*	
1 / (IPO Proceeds)	1.017 ***	1.7	0.944 ***	2.1	0.5049504 ***	1.7	0.4823226 ***	2.1
	11.6		*13.7*		14.0		11.35	
Assets before IPO	0.000 **	1.2	0.000 **	1.3	0.000 **	1.2	0.000 **	1.3
	-2.2		-2.290		*-2.2*		*-2.4*	
LN(AGE)	-9.5E-04 *	1.3	3.5E-04	1.4	-8.8E-04 **	1.3	1.1E-04	1.4
	-1.7		*0.6*		*-2.1*		*0.3*	
Ratio of Primary Shares	0.005 ***	1.2	5.0E-03 ***	1.2	0.004 ***	1.2	0.003 ***	1.2
	3.9		*3.3*		*3.6*		*2.8*	
NASDAQ (dummy)	-0.004 ***	1.7	-0.004 ***	1.8	-0.002	1.7	-0.001	1.8
	-3.0		*-2.7*		*-1.6*		*-0.9*	
Technology firm (dummy)	2.8E-04	1.2	0.001	1.3	0.000	1.2	0.001	1.3
	0.4		*0.9*		*0.8*		*1.8*	
Venture-backing (dummy)	-0.003 ***	1.4	-1.7E-03	1.5	-0.002 ***	1.4	-0.001	1.5
	-3.2		*-1.4*		*-2.9*		*-1.1*	
Underwriter rank (dummy)	0.002	1.3	0.003 **	1.3	0.001	1.3	0.002 **	1.3
	1.6		*2.3*		*1.4*		*2.2*	
Transition-year (dummy)	0.004 **	1.1	0.003	1.1	0.002 **	1.1	0.002	1.1
	2.3		*1.3*		*2.1*		*1.6*	
SOX (dummy)	-0.002	3.0	-0.004	2.7	-0.001	3.0	-0.002	2.7
	-0.9		*-1.9*		*-1.0*		*-1.4*	
SOX (dummy) / (IPO Proceeds)	0.704 ***	3.0	0.795 ***	3.0	0.614 ***	3.0	0.643 ***	3.0
	4.1		*4.8*		*5.4*		*5.7*	
F-statistic	49.0		51.1		56.4		53.1	
R-squared	0.596		0.637		0.518		0.576	
Condition Index	21.6		21.3		21.6		21.3	
Number of observations	1116		708		1116		708	

*Notes: Data are collected from Thomson's SDC platinum database. The sample consists of 1,116 firms that went public between 1998 and 2007. The matched sample consists of 708 IPOs over the same time period. IPO proceeds equal the amount of money raised in the IPO (excl. greenshoe), in year 2000 millions of dollars. Assets before the IPO equal the total assets of the firm before the IPO, in year 2000 millions of dollars. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. Ratio of primary shares denotes the ratio of primary shares to all shares issued. NASDAQ is a dummy variable indicating IPOs that went public on the NASDAQ stock exchange. Firms that SDC defines as belonging to a high-technology industry are classified as technology firms. Underwriter rank is a measure of the quality of the underwriter, with the minimum rank being zero and the maximum being nine, according to Loughran and Ritter's updated measures of the Carter and Manaster rankings. Transition-year is a dummy variable set to 1 in case of the IPO taking place in 2002. SOX is a dummy variable set to 1 in case of the IPO taking place after 2002. White heteroskedasticity robust t-statistics are shown in italics. ***, **, * denote significance at the 1, 5, and 10% level. Condition Index states the highest number of the respective index.*

Assets before the IPO also have a statistically significant negative impact on the direct costs of going public. However, the effect is rather insignificant from an economic point of view. Notably, the age of a company does have a negative impact on the costs of going public. NASDAQ IPOs apparently do not face costs different from NYSE IPOs, the same seems to be true for high-technology firms, for which the regression does not report any effect at all. Apparently, industry background does not have any impact on the direct costs of going public. We may therefore assume that our results regarding the effect of SOX are not driven by a selection bias caused by a change in the mix of IPOs.

The regression results in Panel B of Table 4 indicate that SOX had a very small negative and statistically insignificant impact on underwriting fees. The coefficients of the dummy variables for the NASDAQ, high-technology, and venture-backed firms, and underwriter reputation are statistically significant, but economically rather insignificant. Altogether, these coefficients may be interpreted as such that

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risk inherent in the IPO has a minor influence on the fees charged by the underwriter. This confirms the results found in the context of the so-called 7-percent rule (Hansen 2001). The regression results in Panel C and Panel D of Table 4 describe the impact of SOX on the non-underwriting expenses and accounting and legal fees. In general, the coefficients of both models are very similar with regards to amplitude and significance. In both models, the SOX dummy documents a statistically significant positive coefficient of 89 and 80 bp, respectively. We may therefore conclude that the increase in costs is almost exclusively driven by an increase in accounting and legal fees. The earlier reported impact of company age and ratio of primary shares on the direct costs can also be traced back to accounting and legal fees. Regarding company age for which we report a negative coefficient, we assume that older companies have a better developed accounting infrastructure and, therefore, have to pay slightly lower accounting and legal fees. Regarding the ratio of primary shares, which positively impacts accounting and legal fees, an interpretation is not that obvious. The transition dummy, which is set to 1 in 2002, reports a positive coefficient, which is significantly lower than the coefficient reported by the SOX dummy. It may thus be concluded that some, but not all companies going public in 2002 have been SOX-compliant already.

Table 5 reports the regression results for a specific model – we add an additional explanatory variable, which captures the interaction between the inverse of gross proceeds and the SOX dummy, for the whole and a matched sample. The reason for employing a matched sample is to rule out that our results are driven by self-selection. If SOX has had a differential impact on the propensity to go public on non-listed firms, for instance depending on size or other firm-specific characteristics, a change in average direct costs might result. In order to address this issue, one would have to answer the question as to what would have been the direct costs of post-SOX IPOs if they had gone public in the pre-SOX era. Hence, we are in search of counterfactual evidence. It is known from the literature (Caliendo and Kopeinig 2008) that propensity score matching (PSM) is one method of addressing this problem. In order to implement this approach, we divide the whole sample into a treated (post-SOX IPOs) and an untreated (pre-SOX IPOs) group. For each IPO observation, we calculate a propensity score on the basis of the proceeds raised, assets before the IPO, and company age. It should be noted that including firm assets as an additional variable in the PSM does not alter the results. This is not surprising, as firm assets are highly correlated with IPO proceeds. For lack of space, we do not report this result in the paper. After that, each observation in the post-SOX sample is matched with the nearest neighbor within the pre-SOX sample. We allowed pre-SOX IPOs to be a nearest neighbor more than once.

The models in Panel A (whole sample) and Panel B (matched sample) of Table 5 use the non-underwriting fees as the dependent variable. The regression results for the matched sample are basically the same as for the whole sample. We can, thus, rule out that our findings are driven by a selection bias. Furthermore, the reported coefficients are in line with the ones reported for the base model in Table 4. Only the SOX dummy variable is no longer statistically significant. Meanwhile, the interaction term (SOX / IPO Proceeds) reports a statistically significant coefficient of approximately 0.70, respectively 0.80. The impact of SOX on the direct costs, therefore, is not constant, but strongly size-dependent. According to our results, SOX has an impact on fixed non-underwriting costs. Hence, in line with what we have expected, small offerings in particular, appear to be affected by the introduction of SOX.

The models in Panel C (whole sample) and Panel D (matched sample) of Table 5 use the accounting and legal fees as the dependent variable. The results are basically unchanged. The impact of SOX on accounting and legal fees is again size-dependent, with small offerings being most affected by the introduction of SOX. Moreover, as the coefficients for the SOX variables are almost unchanged, it can be deduced, once again, that the cost impact of SOX is almost entirely channeled via its impact on legal and accounting fees. As a difference, it should be pointed out that company age no longer has an impact on accounting and legal fees. One explanation for this finding might be that the average age of companies going public has been significantly higher after the introduction of SOX. Consequently, the results obtained for age in Table 4 might be driven by a change in the composition of the IPO market. Because of the general insignificance of age from an economic point of view and while not being the focus of this paper, we will not look more deeply into this question.

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As a final robustness test, we modify the regression models tested earlier by substituting the SOX dummy variable by annual dummy variables for the years from 2003 to 2007. By these means, we are able to determine whether the observed impact is constant over time. This is what one would expect if SOX has had a structural impact on the costs of going public. We additionally include a year dummy for 2002, as we have seen earlier that a fraction of IPOs going public in 2002 have apparently already been SOX-compliant. The regression results are reported in Table 6.

In Panel A, we analyze IPO non-underwriting fees. The coefficients of the annual dummies are in line with our prediction of a permanent structural break after the introduction of SOX. For all post-SOX years, the coefficients are positive and highly significant. For 2002 and 2003, the coefficients are significant, but lower than in the subsequent years. As SOX was passed on July 25, 2002, it was not applicable to all IPOs that take place in that year. To some extent, this might also be true for some of the IPOs having taken place in 2003, as the IPO process often starts more than a year before the actual IPO. As there has been a transition period during which the implementation of SOX was not mandatory, it may well be that many of the offerings in 2002 and 2003 were not compliant with SOX as well. The regression analysis of accounting and legal fees in Panel B provides similar results, with all annual dummies from 2003 to 2007 being positive and significant.

Finally, by using a simple linear regression model where we explain costs by size, a dummy variable indicating the SOX period, and an interaction term of both variables (SOX / IPO Proceeds), we produced point estimations for the impact of SOX on different cost items for different offering sizes. The results are not reported in detail. However, it turned out that for a $20 million offering, the direct costs of going public increased by about 16 to 24 percent. This increase is caused by accounting and legal fees, which almost double to 5.9 percent of gross proceeds. A $100 million offering still faces a total direct cost increase of about 5 percent or 40 bp of gross proceeds. For offerings with an issue size beyond $250 million, the impact of SOX on the costs of going public vanishes. Looking at the dollar impact of SOX, we find that up to an offering size of $100 million, the additional cost caused by SOX is quite stable and close to $0.5 million. For larger issues, however, the dollar impact becomes smaller, indicating that from a pure cost perspective, larger IPOs were not significantly affected by SOX. One could conclude that from an auditing point of view, SOX brought about auditing efforts for small offerings adapted to the efforts made already in large offerings, which is further evidence in favor of the notion that SOX has helped to improve information quality and auditing standards in at least a substantial fraction of all IPOs.

Table 6: Regression Analysis of non-underwriting fees and accounting and legal fees with annual SOX dummy variables

	Panel A **Non-Underwriting fees**	Panel B **Accounting and legal fees**	
	Coeff.	**Coeff.**	**VIF**
Intercept	0.001 *0.4*	0.001 *0.3*	
1 / (IPO Proceeds)	1.175 *** *14.3*	0.643 *** *12.6*	1.5
Assets before IPO	0.000 *-1.5*	0.000 *-1.5*	1.2
LN(AGE)	-0.001 * *-1.7*	-0.001 ** *-2.0*	1.3
Ratio of Primary Shares	0.007 *** *4.4*	0.005 *** *4.2*	1.2
NASDAQ (dummy)	-0.002 * *-1.7*	0.000 *0.0*	1.7
Technology firm (dummy)	-0.001 *-0.6*	0.000 *-0.5*	1.2
Venture-backing (dummy)	-0.002 ** *-2.1*	-0.001 * *-1.8*	1.4
Underwriter rank (dummy)	0.001 *0.9*	0.001 *0.6*	1.3
Y2002 (dummy)	0.005 *** *3.2*	0.004 *** *3.3*	1.1
Y2003 (dummy)	0.004 *** *3.2*	0.004 *** *4.4*	1.1
Y2004 (dummy)	0.009 *** *6.1*	0.008 *** *7.7*	1.1
Y2005 (dummy)	0.010 *** *4.3*	0.009 *** *5.8*	1.1
Y2006 (dummy)	0.008 *** *5.9*	0.007 *** *6.3*	1.1
Y2007 (dummy)	0.011 *** *5.9*	0.010 *** *6.9*	1.1
F-statistic	34.4	29.5	
Condition Index	20.8	20.8	
r-squared	0.563	0.459	
Number of observations	1116	1116	

Notes: Data are collected from Thomson's SDC platinum database. The sample consists of 1,116 firms that went public between 1998 and 2007. IPO proceeds equal the amount of money raised in the IPO (excl. greenshoe), in year 2000 millions of dollars. Assets before the IPO equal the total assets of the firm before the IPO, in year 2000 millions of dollars. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. Ratio of primary shares denotes the ratio of primary shares to all shares issued. NASDAQ is a dummy variable indicating IPOs that went public on the NASDAQ stock exchange.

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*Firms that SDC defines as belonging to a high-technology industry are classified as technology firms. Underwriter rank is a measure of the quality of the underwriter, with the minimum rank being zero and the maximum being nine, according to Loughran and Ritter's updated measures of the Carter and Manaster rankings. The year variables 2002, 2003, 2004, 2005, 2006, and 2007 are dummy variables set to 1 in the respective year. White heteroskedasticity robust t-statistics are shown in italics. ***, **, * denote significance at the 1, 5, and 10% levels. Condition Index states the highest number of the respective index.*

5.2 Analysis of the indirect costs

5.2.1 Descriptive statistics

Table 7 reports descriptive statistics on IPOs taking place during the pre-SOX (Panel B) and post-SOX (Panel A) periods. Before the introduction of SOX, offer prices have been adjusted by, on average, 3.0 percent. After the introduction, offer prices have been adjusted by, on average, -2.8 percent, which represents a statistically significant shift downwards from the pre- to post-SOX period by about 6 pp. Adjustments to the offer price, meaning that the issue is not priced at the midpoint of the initially filed bookbuilding range, occur in 87.7 percent (post-SOX) and 85.1 percent (pre-SOX) of all IPOs recorded in the sample. The difference between the post and pre-SOX period is insignificant from a statistical point of view. Range revisions, both up and downwards have, however, decreased significantly after the introduction of SOX. This finding is in line with our view that SOX has improved the precision of the initial pricing done by the underwriter.

The descriptive statistics on underpricing further support our main hypotheses. On average, underpricing has decreased significantly by more than 50 percent after the introduction of SOX. Also, the median underpricing has decreased significantly by 25 percent.

While underpricing was substantially higher and more volatile before the introduction of SOX, IPO size measured by proceeds or firm assets was significantly lower. These findings are in line with the widespread perception that because of the increase in compliance costs, there was a stronger decrease in the propensity to go public for smaller firms as compared to larger firms. Any analysis has to therefore control for the impact of size (and other firm-specific characteristics) on offer price adjustments and underpricing.

Notably, the median underwriter rank has increased from 8 to 9, indicating that many low-reputation underwriters have been driven out of the market after the enactment of SOX. The average age of companies going public has also increased from 13.7 to 20.9 years. Again, the increase is not that strong when comparing medians. Furthermore, we observe a decrease in share overhang after the introduction of SOX.

5.2.2 Regression analysis of offer price adjustments and underpricing

It is known from the underpricing literature that IPO pricing is influenced by several factors, with market sentiment (hot issue markets) and firm characteristics amongst them. Hence, in order to test whether the enactment of SOX had an autonomous impact on offer price adjustments and underpricing, it is necessary to control for these factors. In a first step, we therefore apply an OLS analysis, where we use the natural logarithm of gross proceeds (in million $ and measured in prices of the year 2000), the natural logarithm of the company's age, a dummy variable equal to 1 if the IPO had a lead underwriter with a Carter-Manaster rating of at least 8 (the rating of Carter and Manaster (1990) ranks the reputation of banks on a discrete scale from zero to nine), dummy variables indicating whether the issue has been backed by venture capital, whether the issue has been a spin-off, whether the issue is classified as a high-tech firm, and whether the issue is classified as an Internet firm, as independent variables. Further control variables are the ratio of primary shares to all shares issued in an IPO, the lagged return over 30 trading days on the NASDAQ, a dummy variable equal to 1 if the IPO took place in 1999 or 2000, and the average underpricing of the previous quarter. In order to reveal the impact of SOX on the pricing of IPOs, we include a dummy variable equal to 1 if the IPO took place after 2002 (SOX dummy) and 0 otherwise. To test the robustness of our regression results, we furthermore add the natural logarithm of assets prior to the IPO and the share overhang as independent variables.

Table 8 reports regression results explaining IPO pricing during the period ranging from 1990 to 2007. Due to the presence of heteroskedasticity, the t-statistics are calculated in accordance with White's (1980) method for the approximate estimator for

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Table 7: Comparison of the Pre- and Post-SOX periods

	Panel A IPOs post SOX			Panel B IPOs pre SOX		
	N	Mean	Median	N	Mean	Median
Offer Price adjustment	505	-2.8%	0.0%	3469	3.0% ***	0.0% ***
Adjustments upwards only	219	14.2%	11.1%	1596	21.8% ***	14.3% ***
Adjustment downwards only	224	-20.2%	-17.9%	1355	-17.9% ***	-15.4% ***
% Offer Price adjusted		87.7%			85.1%	
% Range revised up		9.0%			22.4% ***	
% Range revised down		10.6%			17.0% ***	
Underpricing	509	12.2%	7.5%	3473	26.7% ***	10.0% ***
Underpricing (only)	366	18.7%	13.8%	2660	36.2% ***	17.2% ***
Overpricing (only)	108	-6.2%	-3.9%	368	-9.8% **	-5.0% ***
IPO proceeds (2000 $mil)	509	141.81	83.81	3473	82.12 ***	42.87 ***
Assets before IPO (2000 $mil)	442	475.96	100.01	2728	212.00 ***	35.48 ***
Overhang	509	2.94	2.69	2652	3.67 **	2.50
Underwriter Rank	509	8.31	9.00	3473	7.54 ***	8.00 ***
Ratio of Primary Shares	509	0.88	1.00	3473	0.92 ***	1.00 ***
Age of IPO firm	509	20.93	9.00	3473	13.73 ***	7.00 ***
% Venture Capital Backed		47.9%			47.0%	
% Spinoffs		1.0%			7.1% ***	
% Internet Firms		5.3%			2.3% ***	
% Technology Firms		24.2%			30.1% ***	

*Note: The sample consists of 3,982 firms that went public between 1990 and 2007. Offer price adjustment is the percentage change between the midpoint of the initially filed book range and the offer price. Underpricing equals the percentage change between the offer price and the first trading day closing price. IPO proceeds equal the amount of money raised in the IPO (excl. greenshoe), in year 2000 millions of dollars. Overhang is defined as Pre-IPO shares retained divided by shares issued in the IPO, where Pre-IPO shares retained represent shares owned by pre-IPO shareholders that are not sold in the offering. Assets equal firm assets prior to the IPO, in year 2000 millions of dollars. Underwriter rank is a measure of the quality of the underwriter, with the minimum rank being zero and the maximum being nine, according to Loughran and Ritter's updated measures of the Carter and Manaster rankings. Ratio of primary shares denotes the ratio of primary shares to all shares emitted. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. Percent NASDAQ resp. percentage venture capital backed equals the percent of IPOs that were listed at NASDAQ resp. backed by venture capitalists before the IPO. Firms that SDC defines as belonging to a high-tech industry are classified as technology firms. . Firms that, according to SDC provide Internet Services and Software are classified as internet firms. Percentage IPOs of Technology Firms gives the percentage of these firms in the sample. Asterisks denote significance differences between the two samples, based on t-statistics for means and Mann-Whitney-statistics for medians: ***, **, * denote significance at the 1, 5, and 10% levels.*

the variance of the least-squares estimator. Moreover, the variance inflation factor (VIF) is below 5 for all variables, indicating that the estimation may not be subject to multicollinearity problems.

Table 8 uses four different regression models. In model 1, the relative adjustment of the offer price with respect to the midpoint of the initially filed bookbuilding range is used as the dependent variable. In this setup, the SOX dummy coefficient is significantly negative. According to the model, the expected offer price adjustment is lower by 7.4 pp after the enactment of SOX. This finding supports our hypothesis that because of the reduction in the degree of asymmetric information, SOX should have had a negative impact on the offer price adjustments. Notably, we use several control variables in order to sort out the impact of the hot technology market, especially during the internet bubble, and the impact of market sentiment more generally. Actually, the technology firm dummy, the NASDAQ return over the 30-day period before the IPO, the year 1999 and 2000 dummy, as well as the average

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Table 8: Basic regression analysis of price adjustments and underpricing

	(1) Offer price adjustment		(2) Underpricing		(3) Underpricing		(4) Midpoint to Closing price	
	Coeff.	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**
Intercept	-0.194 ***		-0.026		0.160 ***		-0.451 ***	
	-7.1		*-0.5*		*3.8*		*-4.6*	
Ln(IPO Proceeds)	0.071 ***	1.6	0.024 ***	1.6	-0.044 ***	1.7	0.141 ***	1.6
	13.8		*2.5*		*-5.0*		*7.1*	
Ln(1 + Age of IPO Firm)	-0.020 ***	1.1	-0.034 ***	1.1	-0.016 ***	1.1	-0.074 ***	1.1
	-5.7		*-5.3*		*-2.6*		*-6.5*	
Underwr. Reputation (dummy)	-0.018 **	1.5	0.043 ***	1.5	0.060 ***	1.5	0.023	1.5
	-2.1		*2.6*		*3.9*		*0.8*	
Ratio of Primary Shares	-0.087 ***	1.1	0.039	1.1	0.122 ***	1.1	0.003	1.1
	-4.5		*1.3*		*4.2*		*0.1*	
VC-backed (dummy)	0.022 ***	1.2	0.041 ***	1.2	0.020	1.2	0.108 ***	1.2
	3.1		*2.6*		*1.4*		*4.0*	
Spinoff (dummy)	-0.025 *	1.0	-0.051 **	1.0	-0.027		-0.082 *	1.0
	-1.8		*-2.2*		*-1.3*		*-1.9*	
Technology firm (dummy)	0.088 ***	1.2	0.141 ***	1.2	0.056 ***	1.2	0.292 ***	1.2
	9.9		*6.8*		*2.9*		*7.7*	
Internet firm (dummy)	0.030	1.1	0.244	1.1	0.215 **	1.1	0.432 *	1.1
	0.9		*2.3*		*2.3*		*2.0*	
30-day Nasdaq return	0.811 ***	1.0	1.294 ***	1.0	0.520 ***	1.1	2.932 ***	1.0
	12.8		*8.9*		*4.2*		*8.6*	
1999 or 2000 year dummy	0.053 **	4.2	0.325 ***	4.2	0.274 ***	4.2	0.512 ***	4.2
	2.3		*5.7*		*5.6*		*4.5*	
SOX-Dummy (2003 - 2007)	**-0.074** ***	1.2	**-0.056** ***	1.2	**0.015**	1.2	**-0.163** ***	1.2
	-7.7		*-4.3*		*1.1*		*-6.5*	
offer price adjustment					0.960 ***	1.3		
					15.3			
underpricing previous quarter	0.081 **	4.2	0.185 **	4.2	0.106	4.2	0.455 **	4.2
	2.1		*2.0*		*1.4*		*2.4*	
Number of observations	3955		3963		3955		3955	
Condition Index	25.73		25.73		25.55		25.73	
R-squared	23.41%		22.14%		37.00%		23.95%	

*Note: The sample consists of firms that went public between 1990 and 2007. Offer price adjustment is the percentage change between the midpoint of the initially filed book range and the offer price. Underpricing equals the percentage change between the offer price and the first trading day closing price. 30-day Nasdaq return is the lagged return on the NASDAQ Index over the previous 30 trading days. Underpricing previous quarter denotes the average underpricing of the previous quarter. IPO proceeds equal the amount of money raised in the IPO (excl. greenshoe), in year 2000 millions of dollars. Underwriter rank is a measure of the quality of the underwriter, with the minimum rank being zero and the maximum being nine, according to Loughran and Ritter's updated measures of the Carter and Manaster rankings. Ratio of primary shares denotes the ratio of primary shares to all shares emitted. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. VC-backed is a dummy variable that is set to in 1 in case that the IPO was backed by venture capitalists. We rely on SDC to determine whether an offering was a spinoff. Firms that SDC defines as belonging to a high-tech industry are classified as technology firms. Firms that according to SDC provide Internet Services and Software are classified as internet firms. White heteroskedasticity robust t-statistics are shown in italics. ***, **, * denote significance at the 1, 5, and 10% levels. Condition Index states the highest number of the respective index.*

underpricing in the previous quarter turn out to have a significant positive influence on the offer price adjustment.

Model (2) in Table 8 reports the regression results with the underpricing as the dependent variable. Again, the SOX dummy is highly significant and negative. According to the regression results, underpricing has decreased by 5.6 pp after the introduction of SOX. This finding is in line with our hypothesis that SOX has decreased asymmetric information, which in turn is rewarded by lower levels of underpricing.

Again, we control for the impact of hot market periods on the underpricing. We find both the average underpricing of the previous quarter and the lagged 30-day return to have a strongly positive, highly significant impact on the underpricing of an IPO. Moreover, in accordance with the literature (Titman and Trueman 1986, Carter and Manaster 1990, Loughran and Ritter 2004) we find the reputation

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of the underwriter to have a positive and significant impact on underpricing. This finding is particularly interesting when combining it with the coefficient in model (1). There, the impact of reputation on price adjustments is negative. While not being the focus of this paper, it appears as if high-reputable underwriters adjust less and, therefore, allow more underpricing. In this sense, these results are in line with the hypothesis that highly reputable underwriters use underpricing as part of their compensation package.

Table 8 also reports the regression results for model (3) where the underpricing is used again as the dependent variable. In this model, however, we include the offer price adjustment as an explanatory variable into the regression model. As expected, the explanatory power of the model strongly increases from 22 percent to 37 percent as a consequence of the fact that the offer price adjustment is a strong predictor for the underpricing of an IPO. It should be noted that the coefficient of the SOX dummy is now close to zero. Apparently, the reduction in underpricing after the introduction of SOX can be fully explained by the offer price adjustment. From the results of model (1), we know that the offer price adjustment has decreased significantly by 7.4 pp after the introduction of SOX. This is in line with our hypothesis that the post-SOX reduction in underpricing is caused by a lower offer price adjustment, which in turn is the consequence of reduced asymmetric information. According to the coefficient, which is equal to 0.96, an increase in the offer price adjustments by 1 pp should result in an increase of underpricing by about the same amount. Hence, the post-SOX reduction in underpricing of 5.6 pp found in model (2) can be split up in a reduction due to a reduced offer price adjustment (-7.4 pp x 0.96 = -7.1 pp) and an otherwise increased underpricing of 1.5 pp.

Model (4) in Table 8 reports the regression results with the relative distance of the midpoint of the bookbuilding range to the closing price on the first trading day as the dependent variable. Here, the model reports a statistically significant SOX coefficient equal to -16.3 percent, which is basically the combined effect of the reduction in the offer price adjustment plus its impact on the underpricing.

It should be noted that regression results reported in Table 8 remain almost unchanged for different model specifications. For instance, adding the natural logarithm of assets or the share overhang into the model has no material impact on the results. The same is true if the IPOs of the bubble years 1999 and 2000 are excluded from the regression analysis. In this latter case, the coefficient of the SOX dummy in model (2) of Table 8 changes from -5.6 to -3.4 percent; nevertheless, it is still significant at the 1-percent level. For lack of space we do not report these robustness checks here.

5.2.3 Addressing the self-selection bias

Of course, it could be argued against our results that they might be driven by self-selection. If SOX has had a differential impact on the propensity to go public on non-listed firms, for instance depending on size or other firm-specific characteristics, a change in average underpricing might result. Hence, it cannot be ruled out that such a change is completely unrelated to any variation in asymmetric information. In order to address this issue, one would have to answer the question as to what would have been the underpricing of post-SOX IPOs, if they had gone public in the pre-SOX era. Hence, we apply the same propensity score matching (PSM) approach as introduced in section 5.1.2. In this way, a matching firm sample was constructed consisting of 505 pre-SOX and post-SOX IPOs, i.e. a total of 1010 observations. Note that the 505 pre-SOX observations consist of 407 different IPOs.

Regression results presented in Table 9 were re-estimated on the basis of this matching firm sample. Roughly speaking, it could be said that results – in terms of magnitude and significance – are almost unchanged with respect to those presented in Table 8. This is especially true for the SOX dummy coefficients as well as for the offer price adjustment coefficient. After all, these results corroborate the assertion that our earlier findings are not driven by self-selection, i.e. by a change in the characteristics of IPOs that is unrelated to their exposure towards asymmetric information problems.

5.2.4 Other robustness tests

In order to provide additional evidence in favor of our main hypothesis that SOX provided an effective mechanism to reduce asymmetric information for firms going public, we present two additional tests. The first test starts from the idea that the marginal gain from reducing asymmetric information should be higher for those firms that have more difficulties in providing transparent and reliable information to the market. Typically, this should be true for young-

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er firms with higher growth rates and less developed product markets. We capture this idea by splitting up the SOX dummy according to age and listing location. For the latter approach, we start from the admittedly unsophisticated hypothesis that, cum grano salis, the asymmetric information problems should typically be higher for firms addressing a NASDAQ listing instead of listing on the NYSE. The results of this regression analysis are reported in Table 10.

In models (1) and (2), we replace the SOX dummy with two interaction terms depending on whether the issue took place at NYSE or NASDAQ. According to our reasoning presented above, the underpricing of NASDAQ IPOs should be more affected by the enactment of SOX than the underpricing of NYSE IPOs. Furthermore, because listing requirements also work as a screening mechanism, the universe of companies going public is different on the NASDAQ versus NYSE.

Table 9: Matched sample regression analysis of price adjustments and underpricing

	(1) Offer price adjustment		(2) Underpricing		(3) Underpricing		(4) Midpoint to price Closing	
	Coeff.	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**
Intercept	-0.226 ***		0.011		0.218		-0.483 *	
	-3.6		*0.1*		*1.5*		*-1.8*	
Ln(IPO Proceeds)	0.080 ***	1.5	0.045 **	1.5	-0.036 **	1.6	0.183 ***	1.5
	7.5		*2.3*		*-2.1*		*4.1*	
Ln(1 + Age of IPO Firm)	-0.018 ***	1.2	-0.022 **	1.2	0.002	1.2	-0.059 **	1.2
	-2.9		*-2.0*		*0.2*		*-2.5*	
Underwriter Reputation (dummy)	-0.049 ***	1.3	-0.081	1.3	-0.039	1.3	-0.170 **	1.3
	-2.7		*-1.6*		*-0.8*		*-2.1*	
Ratio of Primary Shares	-0.096 ***	1.1	-0.042	1.1	0.076	1.1	-0.083	1.1
	-3.1		*-0.6*		*1.1*		*-0.8*	
VC-backed (dummy)	0.052 ***	1.3	0.097 ***	1.3	0.043	1.3	0.233 ***	1.3
	3.2		*2.9*		*1.5*		*3.2*	
Spinoff (dummy)	-0.031	1.1	-0.074	1.1	-0.041	1.1	-0.129	1.1
	-0.9		*-1.6*		*-1.1*		*-1.1*	
Technology firm (dummy)	0.113 ***	1.3	0.191 ***	1.3	0.079	1.3	0.346 ***	1.3
	5.2		*3.3*		*1.4*		*3.1*	
Internet firm (dummy)	-0.042	1.2	0.054	1.2	0.124	1.2	0.021	1.2
	-1.1		*0.4*		*0.9*		*0.1*	
30-day Nasdaq return	1.096 ***	1.1	1.238 ***	1.1	0.071	1.2	3.910 ***	1.1
	6.4		*3.4*		*0.3*		*3.4*	
1999 or 2000 year dummy	0.083	5.1	0.513 ***	5.1	0.440 ***	5.1	1.053 **	5.1
	1.3		*2.8*		*3.0*		*2.3*	
SOX-Dummy (2003 - 2007)	**-0.069** ***	1.3	**-0.056** **	1.3	**0.016**	1.3	**-0.150** ***	1.3
	-4.8		*-2.0*		*0.5*		*-3.3*	
Offer price adjustment					1.044 ***	1.4		
					7.9			
Underpricing previous quarter	0.058	5.4	0.032	5.4	-0.070	5.4	0.071	5.4
	0.6		*0.1*		*-0.3*		*0.1*	
Number of observations	1010		1010		1010		1010	
Condition index	28.31		28.31		28.59		28.31	
R-squared	27.90%		23.28%		41.42%		24.15%	

*Note: The sample consists of firms that went public between 1990 and 2007. Each IPO that has taken place after the introduction of SOX has been matched with its nearest neighbor out of the pre-SOX period. Matching has taken place on the basis of a propensity score which was calculated using industry background, proceeds raised, and age of the company as selection variables. Offer price adjustment is the percentage change between the midpoint of the initially filed book range and the offer price. Underpricing equals the percentage change between the offer price and the first trading day closing price. IPO proceeds equal the amount of money raised in the IPO (excl. greenshoe), in year 2000 millions of dollars. Underwriter rank is a measure of the quality of the underwriter, with the minimum rank being zero and the maximum being nine, according to Loughran and Ritter's updated measures of the Carter and Manaster rankings. Ratio of primary shares denotes the ratio of primary shares to all shares emitted. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. VC-backed is a dummy variable that is set to in 1 in case that the IPO was backed by venture capitalists. We rely on SDC to determine whether an offering was a spinoff. Firms that SDC defines as belonging to a high-tech industry are classified as technology firms. Firms that according to SDC provide Internet Services and Software are classified as internet firms. 30-day Nasdaq return is the lagged return on the NASDAQ Index over the previous 30 trading days. Underpricing previous quarter denotes the average underpricing of the previous quarter. All other variables are defined in Table 1. White heteroskedasticity robust t-statistics are shown in italics. Asterisks denote significance differences to zero based on t-statistics: ***, **, * denote significance at the 1, 5, and 10% levels. Condition Index states the highest number of the respective index.*

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By separating IPOs according to these listing venues, it is thus possible to isolate those companies that are more likely to benefit from SOX. A closer look at the estimates of models (1) and (2) reveals that the effect of SOX on underpricing is, in fact, different between NYSE and NASDAQ IPOs. While we do not find a significant effect of SOX on the offer price adjustment as well as on the underpricing of NYSE IPOs, the effect of SOX is significantly negative in both cases for NASDAQ IPOs. This finding provides further evidence for a reduction in information asymmetries driving the reduction in underpricing. Furthermore, earlier findings in this paper show that underpricing is different depending on the age of the company. This finding is generally explained by outlining that younger companies are generally associated with higher uncertainty concerning their true value (Ritter 1984, Carter and Manaster 1990, Megginson and Weiss 1991, and Carter, Dark, and Singh 1998). Therefore, SOX should have a substantial impact on the underpricing of young companies in particular. Consequently, we include two further interaction terms between SOX and age in models (3) and (4). As expected, the SOX effect is lower for older companies on both the offer price adjustment as well as the underpricing. Again, we find this to be further evidence in favor of the hypothesis that SOX has led to a reduction in underpricing.

As a final robustness test, we try to address another potential criticism against the interpretation of our results. It is well known that the introduction of SOX went along with a difficult period for global capital markets. The upcoming economic downturn, the 9/11 attacks, and the increased stock market volatility, are just a few symptoms of the difficult period markets have been facing during the years 2001 to 2003. Hence, it may well be that our results are driven by such a fundamental uncertainty in market prospects and/or a stark shift in market sentiment (Leuz 2007). However, if this argument is relevant, we would expect only a temporary impact on IPO markets, while our hypothesis predicts a permanent impact. Consequently, we modify the regression models tested in Table 8 by substituting the SOX dummy variable by annual dummy variables for the years 2003 to 2007. We additionally include a year dummy for 2002 in order to determine whether there has been a structural break after 2002 or after the bubble burst in 2000 or 2001. The regression results are reported in Table 11.

In model (1), we again analyze IPO offer price adjustments. The coefficients of the annual dummies are in line with our prediction of a permanent structural break after the introduction of SOX. For the years 2004 to 2007, the coefficients are negative and highly significant. For 2002 and 2003, the coefficients are not significant. The insignificance of the 2003 dummy can well be explained by the fact that while offerings have taken place in 2003, the indicative bookbuilding range in many cases might have already been filed in 2002, i.e. when SOX had not yet been applicable. The regression analysis of underpricing in model (3) provides similar results, as all annual dummies from 2003 to 2007 are negative and significant, while the dummy for 2002 is positive and insignificant. Findings, therefore, suggest that the structural break in underpricing took place in 2003 and not earlier. Estimations of models (1) and (3) are repeated in models (2) and (4) on the basis of the matched sample. As far as the impact of SOX on the offer price adjustment is concerned, results remain extremely stable. Unfortunately, as far as the impact on underpricing is concerned, we find the coefficients to have similar magnitude, although they lose their significance in some cases. As a final remark, it should be noted that according to model (5), it turns out again that the structural break caused by SOX can be explained via its impact on the offer price adjustment.

6 Conclusion

This paper examined the impact of the introduction of SOX on the cost of going public. Three main hypotheses were tested: (1) According to ample evidence in the literature, we expected direct costs to significantly increase, mostly due to an increase in accounting and legal fees because of increased transparency and compliance standards. (2) We regard SOX as a mechanism to reduce asymmetric information between underwriters and institutional investors. Therefore, we expect the offer price adjustments to be lower after the introduction of SOX; and (3) if more information is available, then the information provided by institutional investors should be less costly. As a consequence, underpricing should have decreased after the introduction of SOX.

First, our results show that direct flotation costs increase by a highly significant 90 bp of gross proceeds.

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Table 10: Regression analysis of price adjustments and underpricing with information-related interaction terms

	(1) Offer price adjustment		(2) Underpricing		(3) Offer price adjustment		(4) Underpricing	
	Coeff.	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**	**Coeff.**	**VIF**
Intercept	-0.314 ***		-0.163 ***		-0.193 ***		0.0	
	-9.5		*-2.8*		*-7.0*		-0.420	
Ln(IPO Proceeds)	0.082 ***	1.8	0.036 ***	1.8	0.071 ***	1.6	0.0 ***	1.6
	14.4		*3.3*		*13.8*		-5.470	
Ln(1 + Age of IPO Firm)	-0.018 ***	1.1	-0.033 ***	1.1	-0.020 ***	1.2	0.0 **	1.2
	-5.3		*-5.1*		*-5.6*		2.490	
Underwriter Reputation (dummy)	-0.016 *	1.5	0.045 ***	1.5	-0.018 **	1.5	0.043 ***	1.5
	-1.9		*2.7*		*-2.2*		*2.6*	
Ratio of Primary Shares	-0.076 ***	1.1	0.052 *	1.1	-0.086 ***	1.1	0.042	1.1
	-4.0		*1.7*		*-4.4*		*1.4*	
VC-backed (dummy)	0.013 *	1.3	0.031 **	1.3	0.023 ***	1.3	0.043 ***	1.3
	1.8		*2.0*		*3.1*		*2.7*	
Spinoff (dummy)	-0.021	1.0	-0.046 **	1.0	-0.025 *	1.0	-0.050 **	1.0
	-1.5		*-2.0*		*-1.7*		*-2.2*	
Technology firm (dummy)	0.082 ***	1.2	0.133 ***	1.2	0.088 ***	1.2	0.140 ***	1.2
	9.2		*6.5*		*9.9*		*6.8*	
Internet firm (dummy)	0.030	1.1	0.246 **	1.1	0.031	1.1	0.249 **	1.1
	0.9		*2.4*		*0.9*		*2.4*	
30-day Nasdaq return	0.781 ***	1.0	1.260 ***	1.0	0.810 ***	1.0	1.290 ***	1.0
	12.3		*8.7*		*12.8*		*8.9*	
1999 or 2000 year dummy	0.044	4.2	0.314 ***	4.2	0.053 **	4.2	0.323 ***	4.2
	1.9		*5.5*		*2.3*		*5.7*	
NASDAQ (dummy)	0.085 ***	1.6	0.099 ***	1.6				
	8.0		*5.3*					
NASDAQ (dummy) * SOX (dummy)	**-0.093** ***	**1.2**	**-0.080** ***	**1.2**				
	-8.2		*-5.2*					
NYSE (dummy) * SOX (dummy)	**-0.027**	**1.3**	**0.014**	**1.3**				
	-1.6		*0.7*					
Young Firm (Age <= 7 years) * SOX (dummy)					**-0.083** ***	**1.1**	**-0.105** ***	**1.1**
					-5.5		*-5.4*	
Old Firm (Age > 7 years) * SOX (dummy)					**-0.067** ***	**1.2**	**-0.024**	**1.2**
					-6.0		*-1.6*	
underpricing previous quarter	0.082 **	4.2	0.186 **	4.2	0.081 **	4.2	0.185 **	4.2
	2.1		*2.0*		*2.1*		*2.0*	
Number of observations	3955		3963		3955		3963	
Condition Index	29.83		29.83		25.38		25.38	
R-squared	24.88%		22.44%		23.42%		22.20%	

*Note: The sample consists of IPOS that went public between 1990 and 2007. Offer price adjustment is the percentage change between the midpoint of the initially filed book range and the offer price. Underpricing equals the percentage change between the offer price and the first trading day closing price. IPO proceeds equal the amount of money raised in the IPO (excl. greenshoe), in year 2000 millions of dollars. Underwriter rank is a measure of the quality of the underwriter, with the minimum rank being zero and the maximum being nine, according to Loughran and Ritter's updated measures of the Carter and Manaster rankings. Ratio of primary shares denotes the ratio of primary shares to all shares emitted. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. VC-backed is a dummy variable that is set to in 1 in case that the IPO was backed by venture capitalists. We rely on SDC to determine whether an offering was a spinoff. Firms that SDC defines as belonging to a high-tech industry are classified as technology firms. Firms that according to SDC provide Internet Services and Software are classified as internet firms. 30-day Nasdaq return is the lagged return on the NASDAQ Index over the previous 30 trading days. Underpricing previous quarter denotes the average underpricing of the previous quarter. All other variables are defined in Table 1. White heteroskedasticity robust t-statistics are shown in italics. Asterisks denote significance differences to zero based on t-statistics: ***, **, * denote significance at the 1, 5, and 10% levels. Condition Index states the highest number of the respective index.*

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Table 11: Regression Analysis of price adjustments and underpricing with annual SOX dummy variables

	Offer price adjustment		Underpricing		Underpricing		Underpricing	
	Coeff.	VIF	Coeff.	VIF	Coeff.	VIF	Coeff.	VIF
Intercept	-0.195 ***		-0.022		0.011		0.2 ***	
	-7.1		*-0.4*		*0.1*		3.840	
Ln(IPO Proceeds)	0.072 ***	1.6	0.023 **	1.6	0.045 **	1.5	-0.046 ***	1.7
	13.7		*2.3*		*2.3*		*-5.0*	
Ln(1 + Age of IPO Firm)	-0.020 ***	1.1	-0.035 ***	1.1	-0.023 **	1.2	-0.016 ***	1.1
	-5.6		*-5.3*		*-2.0*		*-2.7*	
Underwr. Reputation (dummy)	-0.018 **	1.5	0.044 ***	1.5	-0.081	1.3	0.061 ***	1.5
	-2.2		*2.6*		*-1.6*		*4.0*	
Ratio of Primary Shares	-0.086 ***	1.1	0.038	1.1	-0.045	1.1	0.121 ***	1.1
	-4.4		*1.3*		*-0.7*		*4.2*	
VC-backed (dummy)	0.022 ***	1.2	0.041 ***	1.2	0.098 ***	1.2	0.019	1.2
	3.1		*2.6*		*2.9*		*1.3*	
Spinoff (dummy)	-0.025 *	1.0	-0.050 **	1.0	-0.074	1.1	-0.026	1.0
	-1.8		*-2.2*		*-1.6*		*-1.3*	
Technology firm (dummy)	0.088 ***	1.2	0.141 ***	1.2	0.193 ***	1.2	0.056 ***	1.2
	9.9		*6.8*		*3.3*		*2.9*	
Internet firm (dummy)	0.030	1.1	0.245 **	1.1	0.052	1.1	0.216 **	1.1
	0.9		*2.4*		*0.4*		*2.3*	
30-day Nasdaq return	0.802 ***	1.1	1.313 ***	1.1	1.247 ***	1.1	0.545 ***	1.1
	12.5		*9.1*		*3.4*		*4.5*	
1999 or 2000 year dummy	0.054 **	4.2	0.326 ***	4.2	0.511 ***	5.1	0.274 ***	4.2
	2.4		*5.7*		*2.8*		*5.6*	
Y2002	-0.035	1.0	0.086	1.0	0.047	1.1	0.124	1.0
	-1.4		*1.1*		*0.9*		*1.6*	
Y2003	-0.018	1.0	-0.059 **	1.0	-0.069 *	1.1	-0.041	1.0
	-0.8		*-2.0*		*-1.7*		*-1.4*	
Y2004	-0.093 ***	1.1	-0.038 **	1.1	-0.046	1.1	0.054 **	1.1
	-5.3		*-2.1*		*-1.4*		*2.5*	
Y2005	-0.089 ***	1.1	-0.058 ***	1.1	-0.056	1.1	0.027	1.1
	-4.9		*-2.6*		*-1.6*		*1.4*	
Y2006	-0.059 ***	1.1	-0.045 **	1.1	-0.037	1.1	0.012	1.1
	-3.6		*-2.1*		*-1.1*		*0.7*	
Y2007	-0.076 ***	1.1	-0.075 ***	1.1	-0.079 **	1.1	-0.002	1.1
	-4.4		*-3.2*		*-2.2*		*-0.1*	
Offer price adjustment							0.962 ***	1.3
							15.3	
Underpricing previous quarter	0.079 **	4.2	0.188 **	4.2	0.035	5.4	0.111	4.2
	2.0		*2.0*		*0.1*		*1.5*	
Number of observations	3955		3963		1010		3955	
Condition Index	25.42		25.42		28.50		25.61	
R-squared	23.53%		22.18%		23.33%		37.10%	

*Note: The sample consists of IPOs that went public between 1990 and 2007. Regression results in column (3) are based on the matched sample used in Table 9. Offer price adjustment is the percentage change between the midpoint of the initially filed book range and the offer price. Underpricing equals the percentage change between the offer price and the first trading day closing price. IPO proceeds equal the amount of money raised in the IPO (excl. greenshoe), in year 2000 millions of dollars. Underwriter rank is a measure of the quality of the underwriter, with the minimum rank being zero and the maximum being nine, according to Loughran and Ritter's updated measures of the Carter and Manaster rankings. Ratio of primary shares denotes the ratio of primary shares to all shares emitted. Age of the IPO firm is the difference between the founding and issuing dates, denoted in years. VC-backed is a dummy variable that is set to in 1 in case that the IPO was backed by venture capitalists before. We rely on SDC to determine whether an offering was a spinoff. Firms that SDC defines as belonging to a high-tech industry are classified as technology firms. Firms that according to SDC provide Internet Services and Software are classified as internet firms. Y2002, Y2003, Y2004, Y2005, Y2006, Y2007 are dummy variables coded 1 in the respective year and 0 otherwise. 30-day Nasdaq return is the lagged return on the NASDAQ Index over the previous 30 trading days. Underpricing previous quarter denotes the average underpricing of the previous quarter. All other variables are defined in Table 1. White heteroskedasticity robust t-statistics are shown in italics. Asterisks denote significance differences to zero based on t-statistics: ***, **, * denote significance at the 1, 5, and 10% levels. Condition Index states the highest number of the respective index.*

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This increase is almost entirely due to an increase in accounting and legal fees. Moreover, this increase is to a large extent due to an increase in fixed flotation costs. Therefore, smaller firms are by far more heavily affected than larger firms. In fact, we estimate that beyond an offering size of $250 millions there is no SOX-specific impact on direct flotation costs, while up to an offering size of $100 million the additional cost is relatively stable and equal to 0.5 million year 2000 dollars.

Second, we find strong evidence that the level of offer price adjustments has significantly decreased after the introduction of SOX. On average, offer price adjustment is lower by a statistically significant 6 pp in the post-SOX era. Moreover, the book-building range revisions have also become only as half as frequent as in the pre-SOX era. Third, we recorded a highly significant reduction in underpricing by 5.6 pp. Moreover, it fits nicely into our reasoning that this reduction in underpricing can almost entirely be explained by lower adjustments made to the offer price. This is a strong indication that SOX has decreased the degree of asymmetric information between the underwriter and institutional investors.

All of these results turned out to be robust for different alternative model specifications. Most importantly, the same results were obtained after applying a propensity score matching approach in order to control for a potential self-selection bias. In this way, we were able to gather counterfactual evidence in the sense that we can estimate what the flotation costs or the underpricing of a company would have been, if the IPO had been done before the introduction of SOX. Notably, we do not find any evidence that our results are driven by a selection bias. Moreover, we can also show that SOX enactment in 2002 marked a structural permanent shift in the flotation costs as well as the underpricing of IPOs in the US.

Further research questions may emerge from the asymmetric information story presented in this paper. For instance, if our assertion is true, we would expect SOX to have an impact on long-run IPO underperformance. Also, similar effects should be found in the reaction to SEO announcements. And finally, the direct impact of SOX on the firm's cost of capital is a more general issue that has to be further investigated.

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