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Firm value, the Sarbanes-Oxley Act and cross-listing in the U.S., Germany and Hong Kong destinations☆

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ABSTRACT

This paper presents empirical evidence on the effects of the Sarbanes-Oxley Act of 2002 on the value of firms and on the cross-listing choice of firms destined to three major markets in North America, Asia and Europe. We use dynamic panel data methods and treatment effects methods and find that Sarbanes-Oxley has had a negative impact on the value of firms worldwide. Our evidence indicates that Sox may have segmented markets, with many lower valued firms destined to Hong Kong, thus crowding out the market where regulation is more stringent.

1. Introduction

The U.S. financial markets have been one of the best locations in the world to conduct business. However, dubious accounting procedures lead by the Enron and WorldCom debacles have brought

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about significant governance changes in the U.S. markets in the early 21st century. The Sarbanes-Oxley Act (Sox) was passed by Congress in 2002 to raise the level of governance and transparency within the U.S. framework. After the imposition of Sox, the U.S. still ranks highly in terms of international exchanges. Since the imposition of the Sarbanes-Oxley Act tightening corporate accounting and governance requirements, some foreign companies may have shied away from the United States capital markets. Additionally, foreign companies listed in the United States could delist voluntarily if they believed the additional costs added on via Sox compliance outweigh the benefits of cross-listing.[2] Back in 1996, there was a spike in new ADRs (American Depositary Receipts)[3] cross-listings and U.S. listings, coinciding with the peak of the booming Initial Public Offerings (IPO) market of the late 1990s. In that year, the annual number of new Level II and Level III ADR cross-listings reached its peak, but by 2000, new ADR cross-listings significantly decreased. In addition, new Level II and III ADR cross-listings in 2004 and 2005 were at their lowest level since 1992. An adjustment period after the thriving and widely successful 90s would be expected, but a noticeable shift occurred in 2002. The number of ADR de-listings began to increase while the number of domestic de-listings began to level off and actually fell in 2005.

In this paper, we test the effects of the Sarbanes-Oxley Act on worldwide capital markets in the period 2000–2005.[4] In particular, we test whether or not Sox had an effect on the market value of firms worldwide looking for the possibility that Sox had a contagion effect on firm value worldwide. Then, we test whether or not Sox had an effect on cross-listing decisions to U.S., Hong Kong and Germany destinations, looking for the possibility that Sox had a substitution versus contagion effect on cross-listing decisions.

Sox could eventually have had an impact on the market value of firms through the increased cost of compliance. The cost is incurred in the U.S.; if there is a spillover to other international markets then there is a contagion effect on the value of firms worldwide. There could be a potential effect on the number of cross-listings in the U.S. as well. Companies could respond by cross-listing in other markets, a substitution (crowding out) effect.[5]

On the other hand, the benefits of cross-listing, mainly from the perspective of signaling and corporate governance standards could outweigh the costs and a potential crowding in of listings could be possible in the country where standards are raised. In this latter case, we would expect that with higher financial reporting standards and more stringent corporate governance, firms willing to abide by those rules and regulations face additional costs to listing in the U.S. and thus would command a higher premium for cross-listing in the U.S.

Based on a WorldScope panel data set which includes 48,307 firm's valuations over a six year period of time, from 2000 to 2005, spanning 31 countries, we present empirical evidence of the effect of Sox, controlling for cross-listing in the U.S., Germany, and Hong Kong destinations; thus representing three major geographic destinations: North America, Asia and Europe. We use simple univariate methods, dynamic panel methods and treatment effects methods and find that Sarbanes-Oxley (Sox) has had a consistent negative impact on the market value of firms in this period. The statistically significant evidence from differences in means is that, in Hong Kong, the cross-listing premium, i.e. the potential gain in firm value due to listing abroad is consistently negative in 2000–2005; while in the U.S. it is only significant before 2002 and in Germany it is positive before 2002 and negative in 2003–2004. The dynamic panels show that Hong Kong commands a significant discount on the value of a firm cross-listing there, relative to firms that do not cross-list there. However, we do not identify a cross-listing premium in the U.S. or Germany destination in the whole sample period.

[2] A study reported in The Economist, 2005 found that the overall cost of Sarbanes-Oxley compliance in fiscal year 2004-05 was $1.4 trillion.

[3] The ADR program permits individuals in US markets to invest in non-US firms in US dollar-denominated receipts redeemable by specialized US financial institutions (Depositaries) in the underlying shares.

[4] We chose this sample period because it reflects the end of the dot.com bubble in the U.S. and it is a period of relative boom in world markets with few relative risks, except for the events of September 11 in the U.S. See Bianconi and Yoshino (2010) for a thorough discussion of monetary risks domestically and in the U.S. in this sample period.

[5] See Small and Zhu (2007) and Hon, Strauss, and Yong (2007) for analysis of the chilling effect on the U.S. market and contagion respectively. Also, Cetorelli and Peristiani (2010) recently approach the relationship between firm value and cross-listing from the perspective of the potential prestige of the exchange market where cross-listing is taking place.

The evidence from treatment effects, commonly used in this literature, e.g. Bianconi and Tan (2010) and references therein; confirms that Sarbanes-Oxley impacted negatively on the value of firms. However, in terms of valuation we found that the low prospect (low Tobin q) firms sought the Hong Kong market. We find a significant substitution effect of Sox on the value of firms worldwide, controlling for several other factors.[6] But, after Sox, low prospect firms sought funding abroad lending support to the hypothesis that Sox regulation may have segmented markets.

The rest of the paper is organized as follows. In the next section, we review the Sarbanes-Oxley Act, compare the costs and institutional arrangements of cross-listing in the U.S., Hong Kong, and Germany and review the literature. Section 4 describes the data while Section 5 presents the main empirical results. The last section offers concluding remarks. An appendix presents additional tables and results briefly referred in the main text.

2. International Listings and the Sarbanes-Oxley Act of 2002

Firms tend to cross-list abroad for four common reasons.[7] Market segmentation allows investors to escape cross-border barriers to investment. Liquidity effects reduce costs in the sense that the greater liquidity the lower the spreads. The information or signaling hypothesis is based on the premise that cross-listing signals market participants about the financial health of the firm. Finally, the corporate governance hypothesis or "bonding" assumes that firms, whom domestically have poor governance standards, often list their securities on countries with more rigorous governance procedures since they have to adhere to local laws.[8]

The Sarbanes-Oxley Act (Sox) was passed in July 2002 with the main goal of protecting investor interests. The Act first established the Public Company Accounting Oversight Board (PCAOB), which works together with the SEC to oversee auditors of public companies. The PCAOB operates under the same jurisdiction as the SEC and has the authority to discipline violators of the Act and impose penalties. It sets out guidelines separating board members from public accounting firms, and defines auditing, quality control, independence standards and rules, and disciplinary actions and procedures.[9]

In terms of compliance, Sox applies to firms that[10]: i. Have securities registered under section 12 of the Exchange Act; ii. Are required to file reports under section 15d of the Exchange Act; iii. File or have filed a registration statement that has not yet become effective under the Securities Act of 1933 and that they have not been removed. Because Sox does not distinguish between U.S. and non-U.S. firms, and does not exempt non-U.S firms from its effects, the provisions that apply to U.S. firms also apply to non-U.S. firms unless they are specifically excluded by a related provision of the Exchange Act or the Securities Act.

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[6] By substitution, we mean that firms decided to cross-list elsewhere, given the tightening of rules in the U.S. This is as opposed to contagion where cross listing would decline in all markets, given the new rules.

[7] Karolyi (1998, 2005) conducted a thorough review of the cross-listing literature, and Bianconi and Tan (2010) describe those reasons in detail. Cetorelli and Peristiani (2010) examine issues in reference to the potential prestige effects of cross-listing abroad.

[8] For the information hypothesis, see Cantale (1996), Fuerst (1998), Moel (1999), Baker, Nofsinger, & Weaver, 2002, Lang, Lins, and Miller (2003) and Bailey, Karolyi, and Salva (2006). For the corporate governance hypothesis, see Coffee (2002) and Stulz (1999), Doidge, Karolyi and Stulz (2004) and Doidge (2004).

[9] Section two of the act states the functions of auditors and clarifies their independence from their clients. Subsection 201 details which functions cannot be performed by public accounting firms together with an audit in order to prevent conflicts of interest in firm accounting. Other sections outline audit partner rotations, accounting firm reporting procedures, and executive officer independence. Section three defines corporate responsibility. It creates public company audit committees consisting of board members who cannot receive remittance outside of service on the board; declares that executive officers must accompany their financial statements with an emphatic declaration certifying accuracy with failure to include this document must be knowing and intentional to ensure liability; gives federal courts the authority to penalize executives who attempt to change financial statements by granting any favors to investors. Section four explains disclosure and internal audit procedures. It prohibits loans to executives and presents a timeline for disclosure of executive/owner transactions. The remainder of the Act outlines SEC responsibilities including minimum standards for practicing attorneys, essentials for conducting studies, an increase in monetary resources for implementation of the Act, authority to freeze payments, extension of whistleblower protections, and enhancement of white-collar fraud penalties. See USGAO, 2006.

[10] As defined in section 3 of the Securities Exchange Act of 1934 (Exchange Act).

The Sox allows the SEC to determine where and how to apply its provisions to non-U.S. firms. Certain provisions in the Securities Act and Exchange Act do mandate different treatment for different levels of ADR firms. Level I ADRs are required to comply with criminal and whistleblower provisions of Sox; Level IV ADRs are required to comply with criminal provisions of Sox only. Both Level II and Level III ADRs must comply fully with all provisions of Sox. As mandated by Congress, the SEC planned on treating foreign firms in the same manner as it treats domestic firms. During the implementation, however, the SEC realized that in some instances it was impossible for some foreign firms to comply with both the laws of their home country and the terms of Sox. Over time, the SEC has had to provide non-U.S. firms certain accommodations to take into account foreign laws and regulations. For example, the SEC now allows non-management employees to serve as audit committee members. It also lets shareholders select or ratify the selection of auditors, and permits foreign government representation and controlling shareholder nonvoting representation on audit committees. Cross-listed companies availing themselves of those accommodations must disclose their reliance on the accommodations and their assessment of how such reliance might materially affect the ability of their audit committee to act independently. In terms of maintaining the attractiveness and competitiveness of U.S. stock exchanges to foreign companies, most do not believe that the SEC has gone far enough in accommodating non-U.S. firms under Sox.[11]

The implementation of Sox has produced mixed results. Berger, Feng, and Wong (2005) found a variety of positive effects. Others such as Asthana, Balsam, and Kim (2004) and Zhang (2007) found some negative effects. Berger et al. (2005) compared returns to cross-listed foreign companies to returns to U.S. issuers. This lets them evaluate cross sectional variation in reaction based on home-country characteristics, but they cannot assess overall investor reaction to Sox, because of a lack of a control group of companies to which Sox does not apply. Litvak (2007) found that both q and market-to-book ratios of level II and III ADRs declined significantly during 2002 relative to level I and IV ADRs and relative to non cross-listed companies. Doidge, Karolyi, and Stulz (2007) studied the determinants and consequences of cross-listings on the New York and London stock exchanges from 1990 to 2005.[12] They found that there was a significant premium for U.S. exchange listings every year, the premium has not fallen significantly in recent years, it persists even when allowing for unobservable firm characteristics, there is a permanent premium in event time, and these benefits have not been seriously eroded by Sox. Engel, Hayes, and Wang (2007) studied firm's decision to go private as an effect of Sox finding that the quarterly frequency of going-private transactions has increased after the passage of Sox, and abnormal returns surrounding both the passage of Sox and the going-private announcement are significantly related to proxies for the costs and benefits of Sox and the net benefits of being a public firm. Zhang (2007) argued that U.S. firms experienced a statistically significant negative cumulative abnormal return around key Sox events.

Our findings are more in line with Asthana et al. (2004), Zhang (2007) and Litvak (2007) that Sox had a negative effect on firm value. However, our sample is richer in terms of destination of firms, thus we can provide a better worldwide perspective on the effect of Sox in the U.S.[13]

2.1. Costs to International Listing in U.S., Hong Kong and Germany

We describe the main costs to cross-listing in the three destination markets. In the U.S., American Depositary Receipts (ADRs) is the primary way for foreign firms to cross-list. It is a negotiable certificate that represents a foreign company's public traded equity. Depositary Receipts are made when brokers

[11] Table A1 in the appendix summarizes the effective dates of implementing certain sections of Sox for Level II and Level III ADRs, and Table A1 lists the provisions as well as effective compliance dates of Sox. Current accommodations provided by the SEC to Level II and Level III ADRs are highlighted in the shaded cells of Table A1.

[12] See also Bianconi and Tan (2010) for cross-sectional evidence of the U.S. versus UK comparisons and Bianconi and Yoshino (2010) for a dynamic panel analysis of the interplay between firm value, cross-listing and monetary risk measures domestically and in the U.S.

[13] To our knowledge, ours is the first paper to compare the U.S., Hong Kong and Germany destinations and cross-listing premiums.

purchase a company's shares on the respective domestic home stock market followed by delivering it to the depositary's local custodian bank, such as Goldman Sachs, Union Bank of California, State Street, etc. Those banks hold the foreign shares denominated in a foreign currency and issue the U.S. shares denominated in U.S. dollars. There are four levels of ADRs in the U.S. Each level represents a different degree of disclosure requirement and costs. Level 1 ADRs are traded exclusively as over-the-counter Pink Sheet issues. It does not have to abide by the Generally Accepted Accounting Principles (GAAP) reconciliation. However, level 1 ADRs have limited liquidity. Level 4 ADRs are private placements and also do not have to abide by GAAP reconciliation. Level 2 and 3 ADRs require full SEC disclosure with Form 20-F and are the most prestigious and costly type of listing. Level 2 and 3 ADRs have to abide with full Sox compliance. In order to list on the NYSE, the minimum and maximum Listing Fees applicable the first time an issuer lists a class of common shares are $150,000 and $250,000, respectively, which amounts include the special charge of $37,500.[14]

In Hong Kong, the stock market is operated by the SEHK (Stock Exchange of Hong Kong). The SEHK is a wholly owned subsidiary of the HK Exchange. Securities transactions on the SEHK are executed by the Automatic Order Matching and Execution System (AMS). The Growth Enterprise Market (GEM), launched by the SEHK, serves as a conduit where emerging enterprises, which do not fulfill the profitability or track record requirements of the existing market of the Stock Exchange of Hong Kong, can obtain a listing and increase capital. To cross-list in Hong Kong, firms can list either on the Main Board or with GEM. The disclosure requirements in Hong Kong are more flexible than in the U.S. Firms can abide by International Accounting Standards (IAS) or the Hong Kong Financial Reporting Standards.[15] However, if a firms' primary listing is not in Hong Kong, then they are allowed to abide by IAS, Hong Kong Financial Reporting Standards, or U.S. GAAP. In addition, in this period, firm listed in mainland China issued A shares in the Chinese stock exchange, which is much more closed; and the Chinese firms cross-listed companies issued H shares in the more open international Hong-Kong market.

In Germany, firms can cross-list on either the EU-regulated market or the Open Market. A listing on the Regulated Market leads to the General Standard or its Prime Standard segment, while admission to trading on the Regulated Unofficial Market leads to the Open Market with its Entry Standard segment.[16]

Generally speaking, the listing requirements for cross-listing in Hong Kong and Germany are less stringent than in the U.S. Another factor to consider are the listing costs. Entry fees for the U.S. are nearly three times the cost for listing in Germany, and nearly four times that of Hong Kong. Once the initial fixed cost is incurred, then there are the additional external costs brought on by Sox. For a foreign firm to choose to cross-list in the U.S., the benefit from cross-listing must exceed the costs, both fixed and external. Holmstrom and Kaplan (2003) state that shareholders of firms that were well governed prior to Sox are less likely to receive significant Sox-related benefits, and thus that the costs may exceed the benefits for those firms.[17]

3. Data

By definition, q measures the valuation of firms, computed often as total value divided by total assets. In our analysis, following Doidge, Karolyi, and Stulz (2004), we calculate the q as follows:

$$\text{Tobin } q = \frac{\text{Total Liability} + \text{Market Capitalization}}{\text{Total Assets}} \tag{1}$$

where the denominator is the firm's book value of total assets and the numerator is the firm's book value of total liability plus its market capitalization. Market capitalization is computed as the firm's

[14] A table with details of listing fees for listing on the two major U.S. markets is available upon request.
[15] Those are detailed in Hong Kong listing rules 19.14 and 19.39 for overseas issuers.
[16] Tables for Hong Kong and Germany listing fees are also available upon request.
[17] See also Santos and Scheinkman (2001) for a model of competition among exchanges.

common shares outstanding multiplied by its current market price. All financial information used above is obtained at the fiscal year-end from 1999 to 2004.[18]

The Sarbanes-Oxley (Sox) event was modeled in two separate ways. First, we introduce year dummies to measure the marginal time effects on the value of firms. Sox was implemented in 2002, hence we expect differential marginal time effects prior to 2002 and after 2003. Alternatively, we introduce a single time dummy time variable given a value of 1 for all firms in years 2002–2005; and for all cross-listed firms prior to 2002; it takes a value of zero for firms that are not cross-listed before 2002.

Besides the dummy variables for cross-listing, we also include several firm-level and country-level variables as controls. INDU_Q is the median of q of the selected firms in a certain industry, defined by a 2-digit SIC code. Twenty and Hundred are dummy variables used to represent firm size based on asset amounts. A value of 1 was given if a firm has more than $20 million in total assets and $100 million respectively. GDPG is the GDP growth rate of the firm's source country differentiated by year, thus controlling for macroeconomic factors.

The sample firms' financial information comes from the *WorldScope* database (July 2000–July 2005). This database keeps the financial information of several thousand publicly traded companies from over 60 countries around the world. It represents a large proportion of global market capitalization.

We focus on the origin countries of firms that were cross-listed in the U.S., Hong Kong, and Germany. Firms that were domestically listed in the U.S., Hong Kong, and Germany were omitted. Firms from U.S., Hong Kong, or Germany that were cross-listed elsewhere were also omitted. Firms cross-listed on other exchanges not the U.S., Hong Kong, or German exchanges were also omitted. Firms from Canada, the Russian Federation, Bermuda, Cayman Islands, and other small islands were omitted. We concentrate on a sample of 31 countries in the world spread out over a six year period of time.[19] We obtained the firms cross-listed in the U.S. via the CompuStat World Database. The CompuStat, 2007CompuStat database contains all financial information from foreign firms cross-listed in the U.S. since the 1950s as well as de-listing information. We did not limit ourselves to any specific ADR, all four level ADRs were considered because we believe that all four levels of ADRs are prone to some aspects of Sox regulation. After finding the names of the cross-listed firms, we then matched names with the WorldScope database in order to compile the financial information. If the firm's name or financial data was not available, then the firm was omitted. In order to stay consistent, any new listings from a different foreign country over the six year period of time was also omitted. To reduce the weight of outliers, we follow La Porta (2002) and eliminated q at the 2nd and 98th percentiles and our final data set is an unbalanced panel with 48,307 observations. Table 1 presents the 31 countries of origin of firms and the number of observations per year.

Table 2 presents the variable definitions, Table 3 the summary statistics and the correlation matrix, where we note that cross-listings fall in the U.S. and Germany, but increases in Hong Kong. Cross-listing is shown in Table 4b. There were 162 cross-listed firms in the U.S. with financial information available, 132 in 2001, 87 in 2002, 84 in 2003, 81 in 2004, and 71 in 2005 for a total of 617 data points over a six year period of time. The firms cross-listed in Hong Kong and Germany were found via the Hang Seng index website for Hong Kong and the Dusseldorf and Frankfort exchange websites in Germany. We included the Dusseldorf exchange as well because it is a private exchange that deals in private issues. Due to the fact that we also included private ADRs, we also felt it necessary to include the Dusseldorf

[18] Due to data constraints, this measure does not use the market value of debt in the numerator and uses total assets instead of replacement cost in the denominator, see e.g. Doidge et al. (2004).

[19] Canadian and U.S. firms are economically and geographically close, see e.g. Switzer (2010). We trimmed the raw data in the following way. In 2000, there were a total of 10,767 firms in the 31 countries, 13,239 in 2001, 14,983 in 2002, 16,167 in 2003, 17,053 in 2004, and 18,209 in 2005 and over a six year period amounting to 90,418 data points. Then, we exclude observations from the finance, insurance, and real estate industries by eliminating firms that have two-digit SIC code from 60 to 67. This is because the valuation ratios of financial institutions are usually not comparable to those of non-financial firms; see Akhigbe and Martin (2006) for an analysis of the financial services industry in the U.S. This leaves us with 8835 in 2000, 11,501 in 2001, 12,401 in 2002, 13,369 in 2003, 14,282 in 2004, 15,383 in 2005, and a total of 75,771 data points over a six year period of time. We first compiled the firms that were only listed on their domestic exchanges. Once limiting for this factor, our data left us with 5465 data points in 2000, 6106 in 2001, 7642 in 2002, 8586 in 2003, 9658 in 2004, 10,850 in 2005, and resulting in 15,495 total firms in the sample.

Table 1
Countries of origin in the sample and number of observations.

	Country	Year						Total
		2000	2001	2002	2003	2004	2005	
1	Argentina	27	34	44	46	43	46	240
2	Australia	167	231	648	899	960	1,013	3,918
3	Belgium	76	76	86	90	93	93	514
4	Brazil	8	39	39	48	30	20	184
5	Chile	62	92	105	106	107	113	585
6	China	103	115	152	250	1,180	1,318	3,118
7	Denmark	123	121	121	113	104	105	687
8	Finland	101	109	116	112	110	110	658
9	France	407	496	634	697	676	653	3,563
10	Greece	132	155	233	236	236	229	1,221
11	Hungary	26	26	23	21	22	18	136
12	India	3	4	256	296	300	357	1,216
13	Ireland	45	43	40	37	42	38	245
14	Israel	39	40	51	70	74	80	354
15	Italy	102	116	149	152	144	148	811
16	Japan	1,412	1,526	1,605	1,729	1,763	1,899	9,934
17	Korea (South)	241	364	585	613	609	647	3,059
18	Luxembourg	8	11	10	10	11	9	59
19	Mexico	62	75	77	82	90	87	473
20	Netherlands	139	143	130	145	143	129	829
21	New Zealand	36	41	49	82	84	78	370
22	Philippines	47	47	79	89	89	98	449
23	Portugal	54	47	49	48	43	44	285
24	Singapore	155	173	262	382	424	460	1,856
25	South Africa	208	267	297	265	252	211	1,500
26	Spain	49	60	67	94	92	87	449
27	Sweden	178	207	227	227	251	241	1,331
28	Switzerland	57	63	80	88	89	90	467
29	Taiwan	192	190	314	389	441	1,164	2,690
30	United Kingdom	1,198	1,183	1,102	1,157	1,145	1,254	7,039
31	Venezuela	8	12	12	13	11	11	67
	Total	5,465	6,106	7,642	8,586	9,658	10,850	48,307

Note: Total number of firms in the sample is 15,495.

exchange. Private listings cross-listed on the Hong Kong Exchange were also included. After finding the names, we again matched said names with the *WorldScope* database in order to compile the financial information necessary. There were 25 cross-listed firms in Hong Kong in 2000, 35 in 2001, 51 in 2002, 67 in 2003, 79 in 2004, 88 in 2005, amounting to a total of 345 data points over a six year period of

Table 2
Variables definition.

q (Tobin's)	The sum of firm's book value of total liability and its market capitalization divided by the firm's book value of total assets.
Cross	Takes the value of 1 if cross-listed in either the U.S., HK, or Germany and 0 otherwise.
HK	Takes the value of 1 if cross-listed in HK and 0 otherwise.
U.S.	Takes the value of 1 if cross-listed in U.S. and 0 otherwise.
Germany	Takes the value of 1 if cross-listed in Germany and 0 otherwise
Sox	Takes the value of 0 if firm is not listed before the imposition of Sox in 2002.
GDPG	GDP growth rate of the source country corresponding to year
INDU_Q	Median of *q* of the selected firms in a certain industry. The industry is defined according to 2-digit SIC code.
TWENTY	Takes a value of 1 if firm's assets denominated in 2005 U.S. dollars exceeds $20 million
HUNDRED	Takes a value of 1 if firm's assets denominated in 2005 U.S. dollars exceeds $100 million
2002, 2003, 2004, 2005	Takes value of 1 if year $\geq$2002, 2003, 2004, 2005 respectively

Table 3
Summary statistics and correlation matrix.

Variable	Obs	Mean	Std. Dev.	Min	Max
q	48307	1.795331	2.653325	.2276778	42.46558
cross	48307	.0368063	1882878	0	1
hk	48307	.0071418	0842079	0	1
germany	48307	.016892	.128868	0	1
twenty	48307	.8427971	.3639957	0	1
hundred	48307	.5724015	.4947354	0	1
sox	48307	.7672801	.4225696	0	1
indu_q	48307	1.190961	.1970795	.858	2.11
gdpg	48307	3.136202	2.45247	-10.9	17.3
us	48307	.0127725	.1122925	0	1

	q	cross	hk	germany	us	twenty	hundred	sox	indu_q	gdpg
cross	0.0094	1.0000								
hk	−0.0170	0.4339	1.0000							
germany	0.0061	0.6706	−0.0111	1.0000						
us	0.0216	0.5819	−0.0096	−0.0149	1.0000					
twenty	−0.1847	0.0645	0.0251	0.0398	0.0436	1.0000				
hundred	−0.1544	0.1190	0.0405	0.0760	0.0819	0.4997	1.0000			
sox	−0.0549	0.0382	0.0322	−0.0198	0.0626	−0.0813	−0.0969	1.0000		
indu_q	0.1639	0.0237	−0.0154	0.0208	0.0275	−0.2600	−0.2246	0.0762	0.0762	1.0000
gdpg	0.0260	0.0168	0.1801	−0.0728	−0.0234	0.0293	−0.0120	0.0835	0.0835	−0.0629
year	−0.0262	−0.0456	0.0139	−0.0224	−0.0611	−0.0565	−0.0716	0.7844	0.0716	0.1527

time. In Germany, there were 113 cross-listed firms in 2000, 129 in 2001, 142 in 2002, 149 in 2003, 142 in 2004, 141 in 2005, compiling a total of 816 data points over a six year period of time.

4. Econometric models and empirical results

Table 4a reports the average *q* for firms over the six year period of time by four categories: not cross-listed; cross-listed in the U.S.; cross-listed in Hong Kong; and cross-listed in Germany. It also presents the number of firms in each category by year. The columns (1) report the number of firms that are cross-listed neither in the U.S., Hong Kong, or Germany, and their mean *q* by each year. The mean *q* varies widely across years, from a minimum of 0.42 in South Korea to a maximum of 41.4 in Finland. On average, locally financed firms had lower *q* trend from 2000 to 2003 and slightly upward for 2004 and 2005. The columns (2) show the number of firms and the mean *q* for firms that cross-listed in the U.S. There are a total of 617 data points for U.S. cross-listed firms over a six year period of time. The proportion of firms that are listed in the U.S. varies widely across 31 countries, from 2 firms in Greece, to 53 firms from the Netherlands. It then shows the difference in *q* between the U.S. cross-listed firms and the non cross-listed firms for each time period. The difference was positive and statistically significant for U.S. cross-listed firms over the time periods between 2000 and 2001; however from 2002 and on the difference is not statistically significant. After SOX, the unconditional premium is not significant.

The column (3) provides information about the number of firms and the mean *q* for firms cross-listed in Hong Kong, and also calculates the difference in *q* between the Hong Kong cross-listed firms, and the non cross-listed firms for each time period. Here we have a total of 345 cross-listed firms in Hong Kong over a six year period of time. In Hong Kong, China dominates the cross-listings with Singapore a distant second. It then presents the difference between the cross-listed Hong Kong firms and the non cross-listed firms. Hong Kong cross-listed firms showed a statistically significant negative difference in *q* between non cross-listed firms for all six years. The columns (4) provide information about the number of firms, and the mean *q* for firms cross-listed in Germany. Also, it calculates the difference in *q* between the cross-listed firms in Germany and the non cross-listed firms for each time period. There are a total of 816 cross-listed firms in Germany over a six year period of time. In Germany, there were 2 and 3 firms from Venezuela and China respectively with a maximum of 71 firms

Table 4a
Univariate analysis of firm value.

	Not cross-listed (1)		Cross-listed in U.S. (2)			Cross-listed in HK (3)			Cross-listed Germany (4)			Total
	Number	Mean q	Number	Mean q	Diff[a]	Number	Mean q	Diff[a]	Number	Mean q	Diff[a]	
2000	5165	2.24	162	3.01	0.77***	25	0.77	−1.47***	113	3.19	0.95**	5465
2001	5810	1.87	132	2.76	0.89**	35	1.18	−0.69***	129	2.39	0.52*	6106
2002	7362	1.56	87	1.98	0.42	51	1.03	−0.53***	142	1.52	−0.04	7642
2003	8286	1.47	84	1.43	−0.04	67	1.12	−0.35***	149	1.31	−0.16**	8586
2004	9356	1.87	81	1.78	−0.09	79	1.51	−0.36***	142	1.69	−0.18*	9658
2005	10550	1.84	71	1.79	−0.05	88	1.44	−0.4*	141	1.73	−0.11	10850
Average q		1.80		2.125			1.175			1.97		
Total	46529		617			345			816			48307

[a] Test of difference between means (one tailed two-sample t test with unequal variances).
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

Table 4b
Univariate analysis of firm value – cross-listed sample.

	Cross-listed in U.S.		Cross-listed in HK		Cross-listed in Germany		Diff U.S. HK[a] (5)	Diff U.S. Germany[a] (6)	Diff HK Germany[a] (7)	Total
	Number	Mean q	Number	Mean q	Number	Mean q				
2000	162	3.01	25	0.77	113	3.19	2.24***	−0.18	−2.42***	300
2001	132	2.76	35	1.18	129	2.39	1.58***	0.37	−1.21***	296
2002	87	1.98	51	1.03	142	1.52	0.95**	0.46	−0.49***	280
2003	84	1.43	67	1.12	149	1.31	0.31***	0.12	−0.19**	300
2004	81	1.78	79	1.51	142	1.69	0.27*	0.09	−0.18	302
2005	71	1.79	88	1.44	141	1.73	0.35	0.06	−0.29	300
Average q		2.125		1.175		1.97				
Total	617		345		816					1778

[a] Test of difference between means (one tailed two-sample t test with unequal variances).
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

cross-listed from the UK. It then shows the difference in q between the cross-listed firms in Germany and non cross-listed firms for each time period. A premium is statistically significant for 2000 and 2001, whereas a discount is statistically significant for 2003–2004; the remaining years are not significant.

Table 4b shows differences in means among the cross-listed firms by destination. Column (5) shows that relative to Hong Kong, firms listed in the U.S. commanded a significant but declining premium between 2000 and 2004. Column (6) shows that relative to Germany the U.S. commanded no significant premium in the six year sample period. Column (7) shows that Germany commands a significant but declining premium relative to Hong Kong from 2000 to 2003.

The evidence from Tables 4a and 4b shows that in Hong Kong the premium is negative, hence firms with lower prospects cross-listed in HK relative to both the U.S. and Germany, but this movement decreased with Sox.[20] For the cross-listed sample, there is no statistically significant difference for firms cross-listed in the U.S. relative to Germany in the period.

4.1. Dynamic panel regressions

We used an unbalanced dynamic panel where firms are counted only in one country of origin where the sample size becomes of size 48,307. We also separate based upon cross-listing destination. We capture Sox's effect on overall firm value, on cross-listing, on U.S. cross-listing, and potentially whether the increased corporate governance in the U.S. could possibly have also affected other global exchange markets thus creating a contagion effect in Hong Kong and Germany destinations. We test those hypotheses using the Arellano and Bond (1991) dynamic panel methodology. The general models are given by

$$q_{it} = \beta_0 + \beta_1 q_{it-1} + \beta_{22}2002 + \beta_{23}2003 + \beta_{24}2004 + \beta_{25}2005 + \beta_3 cross_{it} + \boldsymbol{\beta}'\boldsymbol{X}_{it} + a_t + \varepsilon_{it} \quad (2a)$$

$$q_{it} = \beta_0 + \beta_1 q_{it-1} + \beta_2 Sox_{it} + \beta_3 cross_{it} + \boldsymbol{\beta}'\boldsymbol{X}_{it} + a_t + \varepsilon_{it} \quad (2b)$$

where i indexes the company and t indexes the year. $\boldsymbol{X}_{it}$ is a vector of controls which includes the industry q (INDU_Q), growth of gdp (GDPG), firm size (size), country, industry, sector, time trend effects, and all potential interaction terms. Model (2a) captures the effect of Sox through a continuous set of time dummies. β_{22} is the time effect before 2002 and after; and β_{2t} is the marginal effects between t and $t+1$ for $t = 2002, 2003, 2004$. The main hypothesis is that $\beta_{22} < 0$, the effect of Sox is negative; and $\beta_{22} \neq \beta_{2t}$ for $t = 2003, 2003, 2004, 2005$. Alternatively, model (2b) captures the effects

[20] The discount in Hong Kong is also partially due to the closed nature of the A shares market, they were overvalued in China relative to the more competitive international Hong Kong market.

of the weak single dummy of Sox. More specifically, β_2 is the effect of Sox on firm value of firms relative to firms that are not cross-listed before year 2002. β_3 is the effect of cross-listing on firm value for all public firms in both models.

The variable INDU_Q is used to control for the growth opportunity in a certain industry and should have a positive coefficient. If the high q valuation of a cross-listed firm is simply because they have better investment opportunities, controlling for growth opportunity in the regression should make the cross-listing premium disappear. The variable GDPG is used to control for country macroeconomic factors. The coefficient of this variable is ambiguous as country's growth opportunities are different among developed, developing and emerging countries. Size refers to the variables Twenty and Hundred, used to control for firm size and thus try to capture growth opportunity of the firm. Specifications (2a,b) refer to overall firm value and its effect on valuation, we also condition on cross-listing destination.

We use the Arellano and Bond (1991) dynamic panel estimation since we have a small number of years and a large number of firms. The method is based on GMM with first differences, and fixed effects are appropriately taken into account. The results for the general specifications (2a) are shown in Tables 5–8.[21]

Table 5 presents the results for the general case. First, the before-and-after *2002* time dummy has a negative effect on firm value throughout the alternative specifications (1)–(11). The order of magnitude of the effect is between −12% and −17%. Those effects are significantly different for the other years. Second, the cross-listing effect on the value of the firm is negative, but only marginally significant in most cases significant. The interaction between the time dummies and cross-listing are not significant in specifications (1)–(5). The cross-listing effect is negative and marginally significant, but the result is not robust to alternative controls. The persistence of the value of the firm is moderate and about 26% for all specifications (1)–(11).

In columns (6)–(11), we separate cross-listing by destination and use alternative specifications depending on controls. The results regarding the Sarbanes-Oxley time dummy (2002) remain unchanged; and the other years are statistically different as well. The effects of cross-listing show that the Asian market of Hong-Kong destination commanded a discount of between 12% and 21% (low prospect firms seem to have gone to HK). The U.S. destination also commanded a discount with a marginal significance only; whereas Germany destinations did not have any significant cross-listing effect. The interaction terms show that cross-listed firms in the U.S. commanded a significant premium in 2003; and in Germany in 2005. However, cross listed firms in Honk Kong commanded a robust discount in 2005. The persistence of the value of the firm is moderate and about 25% for specifications (6)–(11) as well.

In summary, firms cross-listed after 2002 do have lower q valuations and lower prospect firms (lower q) cross-listed in Hong Kong. One year after the implementation of Sox, firms that cross-listed in the U.S. commanded a significant premium. This shows that the firms already cross-listed U.S. benefited from the implementation of Sox.[22]

Tables 6–8 present results by the three destinations: U.S., Hong-Kong and Germany; thus capturing North America, Asia and Europe destinations.[23] Table 6, columns (1)–(6) present the U.S. destination case. The sample excludes all firms cross-listed in Hong-Kong and Germany. The results are very close to the general case in Table 5. The 2002 time effect is negative and robust, and the effects on the other years are significantly different. Sarbanes-Oxley (Sox) has a negative effect on firm value throughout the alternative specifications (1)–(6) with order of magnitude between −10% and −16% on the value of the firm. The cross-listing effect for the U.S. destination on the value of the firm is negative but marginally significant. The interaction terms show that cross-listed firms in the U.S.

[21] The Arellano–Bond method has also the advantage that the first difference across firms takes away potential fixed effects at the firm level. The results for specification (2b) are available in the working paper version, Bianconi, Chen, and Yoshino (2011).

[22] There could be the potential adverse selection problems of implementing regulation. The more stringent rule implemented by Sox in the U.S. could have attracted lower q firms who sought a label that they were safe to get financed, thus increasing the demand for international exposure. However, we do not find this effect in the U.S. But, in Hong Kong – through the crowding out – this effect is robust.

[23] Recently, the Deutsche Bourse group showed interest to buy the NYSE, thus creating the largest exchange in the world.

Table 5
General model.

	Dependent Variable: q				
	(1)	(2)	(3)	(4)	(5)
2002	−0.119*** (0.031)	−0.120*** (0.031)	−0.117*** (0.031)	−0.166*** (0.036)	−0.127*** (0.048)
2003	−0.034 (0.031)	−0.035 (0.031)	−0.046 (0.031)	−0.014 (0.034)	0.0021 (0.050)
2004	0.350*** (0.023)	0.350*** (0.023)	0.350*** (0.024)	0.311*** (0.026)	0.350*** (0.045)
2005	−0.071*** (0.027)	−0.071*** (0.027)	−0.071*** (0.028)	−0.034 (0.028)	–
Cross-list	–	−0.190* (0.101)	−0.256* (0.148)	−0.277* (0.147)	−0.218* (0.128)
Cross×2002	–	–	−0.057 (0.128)	0.013 (0.129)	0.013 (0.127)
Cross×2003	–		0.150 (0.116)	0.168 (0.115)	0.162 (0.114)
Cross×2004	–	–	0.143 (0.136)	0.158 (0.134)	0.154 (0.133)
Cross×2005	–	–	0.149 (0.132)	0.140 (0.130)	0.146 (0.131)
Size	–	–	–	y	y
Industry q	–	–	–	y	y
GDP growth	–	–	–	y	y
Country	–	–	–	–	y
Trend	–	–	–	–	y
Lagged q	0.269*** (0.028)	0.269*** (0.028)	0.270*** (0.028)	0.266*** (0.027)	0.266*** (0.027)
Constant	1.073*** (0.072)	1.081*** (0.072)	1.084*** (0.071)	1.724*** (0.285)	74.11 (55.80)
χ^2	494.3***	498.1***	537.5***	607.5***	35,254***
AR(2) error z	−0.591	−0.589	−0.582	−0.762	−0.946
Obs	20,891	20,891	20,891	20,891	20,891

	Dependent variable: q					
	(6)	(7)	(8)	(9)	(10)	(11)
2002	−0.120*** (0.031)	−0.167*** (0.035)	−0.128*** (0.047)	−0.116*** (0.031)	−0.174*** (0.037)	−0.127*** (0.048)
2003	−0.035 (0.031)	−0.005 (0.034)	0.029 (0.050)	−0.045 (0.031)	−0.012 (0.034)	0.021 (0.050)
2004	0.350*** (0.023)	0.311*** (0.025)	0.350*** (0.044)	0.351*** (0.024)	0.303*** (0.032)	0.351*** (0.045)
2005	−0.071*** (0.027)	−0.034 (0.027)	–	−0.072*** (0.028)	–	–
Cross-list U.S.	−0.209* (0107)	−0.202* (0.105)	−0.143* (0.078)	−0.265 (0162)	−0.285* (0.161)	−0.212 (0.139)
Cross-list HK	−0.185** (0.070)	−0.239*** (0.083)	−0.218*** (0.084)	−0.118 (0.079)	−0.120*** (0.090)	−0.101 (0.090)
Cross-list Germany	0.053 (0.267)	0.090 (0.267)	0.260 (0.289)	−0.074 (0.338)	−0.080 (0.334)	0.064 (0.347)
CrossUS2002	–	–	–	(·)	(·)	(·)
CrossUS2003	–	–	–	0.266** (0.110)	0.213* (0.109)	0.184* (0.092)

CrossUS2004	–	–	–	(·)	(·)	(·)
CrossUS2005	–	–	–	(·)	(·)	(·)
CrossHK2002	–	–	–	(·)	(·)	(·)
CrossHK2003	–	–	–	(·)	(·)	(·)
CrossHK2004	–	–	–	(·)	(·)	(·)
CrossHK2005	–	–	–	−0.119** (0.074)	−0.229*** (0.070)	−0.197*** (0.075)
CrossG2002	–	–	–	(·)	(·)	(·)
CrossG2003	–	–	–	0.186* (0.098)	(·)	(·)
CrossG2004	–	–	–	(·)	(·)	(·)
CrossG2005	–	–	–	0.115* (0.064)	(·)	0.108** (0.063)
Size	–	y	y	–	y	y
Industry q	–	y	y	–	y	y
GDP growth	–	y	y	–	y	y
Country	–	–	y	–	–	y
Trend	–	–	y	–	–	y
Lagged q	0.269*** (0.028)	0.265*** (0.027)	0.265*** (0.027)	0.270*** (0.028)	0.267*** (0.027)	0.266*** (0.027)
Constant	1.077*** (0.072)	1.721*** (0.285)	73.86 (54.03)	1.080*** (0.072)	1.726*** (0.291)	74.50 (55.83)
χ^2	506.3***	576.7***	37,134***	595.4***	520.4***	3,574***
AR(2) error z	−0.592	−0.773	−0.956	−0.586	−0.756	−0.949
Obs	20,891	20,891	20,891	20,891	20,891	20,891

Notes: Robust standard errors in parenthesis. Due to lagged instruments, dummy for 2001 is omitted. Controls: Size: Twenty, Hundred; Industry q, lagged Industry q; Growth of GDP, lagged growth of GDP; Countries, time trend. "y" means control is included. Sargan tests available upon request for all tables.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 6
United States destination.

	Dependent variable: q					
	(1)	(2)	(3)	(4)	(5)	(6)
2002	−0.114*** (0.031)	−0.115*** (0.032)	−0.111*** (0.029)	−0.106*** (0.031)	−0.161*** (0.037)	−0.121*** (0.049)
2003	−0.037 (0.031)	−0.038 (0.031)	−0.043 (0.031)	−0.042 (0.031)	−0.010 (0.035)	−0.025 (0.051)
2004	0.352*** (0.023)	0.353*** (0.023)	0.352*** (0.024)	0.352*** (0.024)	0.313*** (0.026)	0.354*** (0.046)
2005	−0.072** (0.028)	−0.072** (0.028)	−0.072** (0.028)	−0.072 (0.028)	−0.035 (0.028)	–
Cross-list U.S.	–	−0.218* (0.104)	−0.278* (0.167)	–	−0.301* (0.166)	−0.232 (0.143)
CrossUS2002	–	–	(·)	−0.305* (0.135)	(·)	(·)
CrossUS2003	–	–	0.271* (0.114)	0.211* (0.096)	0.220* (0.112)	0.182* (0.093)
CrossUS2004	–	–	(·)	(·)	(·)	(·)
CrossUS2005	–	–	(·)	(·)	(·)	(·)
Size	–	–	–	–	y	y
Industry q	–	–	–	–	y	y
GDP Growth	–	–	–	–	y	y
Country	–	–	–	–	–	y
Trend	–	–	–	–	–	y
Lagged q	0.272*** (0.029)	0.272*** (0.029)	0.273*** (0.029)	0.272*** (0.029)	0.269*** (0.028)	0.269*** (0.028)
Constant	1.068*** (0.075)	1.072*** (0.075)	1.072*** (0.075)	1.066***		
(0.075)	1.739*** (0.290)	76.38 (56.27)				
χ^2	488.1***	491.0***	491.0***	530.3***	597.9***	30,114***
AR(2) error z	−0.798	−0.800	−0.800	−0.796	−0.972	−1.168
Obs	20,334	20,334	20,334	20,334	20,334	20,334

Notes: Robust standard errors in parenthesis. Due to lagged instruments, dummy for 2001 is omitted. Controls: Size: Twenty, Hundred; Industry q, lagged Industry q; Growth of GDP, lagged growth of GDP; Countries, time trend. "y" means control is included. (·) refers to included but not statistically significant.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 7
Hong Kong destination.

	Dependent variable: q					
	(1)	(2)	(3)	(4)	(5)	(6)
2002	−0.104*** (0.032)	−0.104*** (0.032)	−0.104*** (0.032)	−0.104*** (0.032)	−0.156*** (0.037)	−0.116* (0.050)
2003	−0.038 (0.032)	−0.038 (0.032)	−0.039 (0.032)	−0.039 (0.032)	−0.007 (0.036)	0.028 (0.052)
2004	0.353*** (0.024)	0.353*** (0.024)	0.353*** (0.024)	0.353*** (0.024)	0.316*** (0.026)	0.360*** (0.046)
2005	−0.074** (0.028)	−0.074** (0.028)	−0.072** (0.028)	−0.072** (0.030)	−0.035 (0.029)	–
Cross-list HK	–	−0.160* (0.071)	−0.093 (0.076)	–	−0.107 (0.091)	−0.106 (0.091)
CrossHK2002	–	–	(·)	(·)	(·)	(·)
CrossHK2003	–	–	(·)	(·)	(·)	(·)
CrossHK2004	–	–	(·)	(·)	(·)	(·)
CrossHK2005	–	–	−0.189* (0.073)	−0.190* (0.074)	−0.198** (0.074)	−0.196** (0.074)
Size	–	–	–	–	y	y
Industry q	–	–	–	–	y	y
GDP growth	–	–	–	–	y	y
Country	–	–	–	–	–	y
Trend	–	–	–	–	–	y
Lagged q	0.275*** (0.030)	0.275*** (0.030)	0.275*** (0.030)	0.275*** (0.030)	0.271*** (0.029)	0.271*** (0.029)
Constant	1.053*** (0.076)	1.054*** (0.076)	1.072*** (0.075)	1.053*** (0.076)	1.733*** (0.292)	76.62 (56.49)
χ^2	472.8***	478.1***	495.8***	493.5***	557.7***	28,163***
AR(2) error z	−0.747	−0.747	−0.745	−0.745	−0.928	−1.168
Obs	20,175	20,175	20,175	20,175	20,175	20,175

Notes: Robust standard errors in parenthesis. Due to lagged instruments, dummy for 2001 is omitted. Controls: Size =Twenty, Hundred; Industry q, lagged Industry q; Growth of GDP, lagged growth of GDP; Countries, time trend. "y" means control is included. (·) refers to included but not statistically significant.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 8
Germany destination.

	Dependent variable: q					
	(1)	(2)	(3)	(4)	(5)	(6)
2002	−0.109*** (0.031)	−0.109*** (0.031)	−0.109*** (0.031)	−0.108*** (0.031)	−0.160*** (0.036)	−0.121* (0.049)
2003	−0.037 (0.031)	−0.037 (0.031)	−0.041 (0.031)	−0.041 (0.031)	−0.009 (0.035)	0.025 (0.051)
2004	0.351*** (0.023)	0.351*** (0.023)	0.352*** (0.024)	0.352*** (0.024)	0.314*** (0.026)	0.353*** (0.046)
2005	−0.069** (0.027)	−0.069* (0.031)	−0.072** (0.028)	−0.072 (0.028)	−0.034 (0.028)	–
Cross-list Germany	–	0.030 (0.316)	−0.094 (0.391)	–	−0.082 (0.388)	0.048 (0.417)
CrossGer2002	–	–	(·)	(·)	(·)	(·)
CrossGer2003	–	–	(·)	(·)	(·)	(·)
CrossGer2004	–	–	(·)	(·)	(·)	(·)
CrossGer2005	–	–	0.110* (0.066)	0.109* (0.065)	(·)	(·)
Size	–	–	–	–	y	y
Industry q	–	–	–	–	y	y
GDP growth	–	–	–	–	y	y
Country	–	–	–	–	–	y
Trend	–	–	–	–	–	y
Lagged q	0.272*** (0.028)	0.272*** (0.028)	0.273*** (0.029)	0.273*** (0.028)	0.268*** (0.028)	0.269*** (0.028)
Constant	1.062*** (0.073)	1.062*** (0.073)	1.064*** (0.073)	1.062*** (0.073)	1.707*** (0.290)	74.93 (56.03)
χ^2	479.1***	480.0***	505.6***	504.2***	573.2***	32,112***
AR(2) error z	−0.565	−0.565	−0.569	−0.569	−0.751	−1.168
Obs	20,442	20,442	20,442	20,442	20,442	20,442

Notes: Robust standard errors in parenthesis. Due to lagged instruments, dummy for 2001 is omitted. Controls: Size: Twenty, Hundred; Industry q, lagged Industry q; Growth of GDP, lagged growth of GDP; Countries, time trend. "y" means control is included. (·) refers to included but not statistically significant.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

commanded a marginally significant premium in 2003, and a significant discount in 2002 in column (4). The persistence of the value of the firm is moderate and about 25% for all specifications (1)–(6).

Table 7, columns (1)–(6) present the Hong Kong destination case. The sample excludes all firms cross-listed in the United States and Germany. The 2002 time effect is negative and robust, and the effects on the other years are significantly different. Sarbanes-Oxley (Sox) has a negative effect on firm value throughout the alternative specifications (1)–(6) with order of magnitude between −10% and −15% on the value of the firm. The cross-listing effect for the HK destination on the value of the firm is not significant. The interaction terms show that cross-listed firms in HK commanded a marginally significant discount in 2005. The persistence of the value of the firm is moderate and about 27% for all specifications (1)–(6). By 2005, HK has only attracted low prospect foreign firms.

Finally, Table 8, columns (1)–(6) present the Germany destination case. The sample excludes all firms cross-listed in the United States and Hong-Kong. The 2002 time effect is negative and robust, and the effects on the other years are significantly different. Sarbanes-Oxley (Sox) has a negative effect on firm value throughout the alternative specifications (1)–(6) with order of magnitude between −10% and −16% on the value of the firm. The cross-listing effect for the Germany destination on the value of the firm is not significant. The interaction terms show that cross-listed firms in Germany commanded a marginally significant premium in 2005 in columns (3) and (4) only. The persistence of the value of the firm is moderate and about 27% for all specifications (1)–(6).

The evidence from Tables 5–8 is that the before-and-after 2002 time dummy is negative and robust, and statistically different than the other years. Sarbanes-Oxley seems to have made destination countries attract more foreign firms with lower q, thus with lower prospects.[24]

4.2. Treatment effects

It is possible that firms with higher market valuation self-select into cross-listing. Firms with higher market value may gain more benefits from cross-listing than the costs borne onto them through the added disclosure requirements. We apply treatment effect methods to avoid potential biases. In particular, we can think of Sox and other characteristics as a treatment for the firm's cross-listing decision. Each firm has a valuation outcome with and without this treatment. We use the propensity score method.[25] The models consist of the following two equations:

$$Prob(cross_{it} > 0 | year_t, \boldsymbol{X}_{it}) = \boldsymbol{\Phi}(\beta_0 + \beta_{22}2002 + \beta_{23}2003 + \beta_{24}2004 + \beta_{25}2005 + \boldsymbol{\beta}'\boldsymbol{X}_{it}) \quad (3a)$$

$$q_{it} = \beta_0 + \beta_{22}2002 + \beta_{23}2003 + \beta_{24}2004 + \beta_{25}2005 + \beta_3 cross_{it} + \beta_2 Sox_{it} + \boldsymbol{\psi}'\boldsymbol{Z}_{it} + \varepsilon_{it} \quad (3b)$$

$$Prob(cross_{it} > 0 | Sox_{it}, \boldsymbol{X}_{it}) = \boldsymbol{\Phi}(\beta_0 + \beta_3 Sox_{it} + \boldsymbol{\beta}'\boldsymbol{X}_{it}) \quad (3c)$$

$$q_{it} = \beta_0 + \beta_1 cross_{it} + \beta_2 Sox_{it} + \boldsymbol{\psi}'\boldsymbol{Z}_{it} + \varepsilon_{it} \quad (3d)$$

where in (3a,c), $cross_{it}$ is the cross-listing dummy variable, Φ is the standard normal c.d.f. in the probit model and (3a,d) is the valuation equation; $\boldsymbol{X}$ and $\boldsymbol{Z}$ are controls. We estimate the decision equation using the panel and use the predicted propensity to cross-list as an instrument for cross-listing in the valuation equation. Table 9 presents the results for the general case.[26]

Table 9 is the large sample. Columns (1) and (2) are the propensity score regressions. The decision equation, column (1) shows a marginally significant negative effect of Sarbanes-Oxley on cross-listing in 2003 and 2005. Column (2) shows the valuation equation. The significant effects for 2002 and 2003 are negative on the value of firms and positive for 2004. The cross-listing premium is negative and not statistically significant in this case.

The evidence from treatment effects confirms that Sarbanes-Oxley impacted negatively on the value of firms in general. Table 5 shows that the firms cross-listed in the U.S. commanded a premium

[24] The Sox single weak dummy has a robust negative effect on the value of firms and shows that destination countries attract lower valued firms with the implementation of Sox; Bianconi et al. (2011).

[25] We also used the Heckman two-step estimator, results are available upon request. See e.g. Greene (1997) and Wooldridge (2002).

[26] Specifications (3c,d) are available in the working paper version, Bianconi et al. (2011).

Table 9
General model: treatment effects.

	(1) Panel Dependent variable: *Cross* First stage probit	(2) Dependent variable: *q* Second stage IV
2002	−0.035	−0.283***
	(0.029)	(0.041)
2003	−0.055*	−0.135***
	(0.027)	(0.042)
2004	−0.028	0.306***
	(0.028)	(0.032)
2005	−0.059*	(·)
	(0.026)	
Cross-list	–	−1.634
		(1.367)
Size	y	y
Industry *q*	y	y
GDP Growth	y	y
Constant	−2.218***	0.883***
	(0.178)	(0.174)
χ^2	58.2***	1,284**
F-test first stage	–	39.39***
R^2 first stage	–	0.022
Obs	32,306	32,306

Notes: Due to lagged instruments, dummy for 2001 is omitted. Controls: Size: Twenty, Hundred; Industry *q*, lagged Industry *q*; Growth of GDP, lagged growth of GDP. "y" means control is included. (·) refers to included but not statistically significant.

* $p < .05$.
** $p < .01$.
*** $p < .001$, robust.

in 2003. Hence, even though the already cross-listed firms commanded a premium in the U.S. in 2003, the implementation of Sox in 2002 discouraged firms to cross-list in the U.S. in the following year. Moreover, Tables 4a and 4b show that until 2002, more low prospect foreign firms (with lower *q*) did not get financed abroad (did not cross-list); but after 2002, the low prospect firms are the ones that go abroad.

5. Summary and conclusions

The implementation of the Sarbanes-Oxley Act in 2002 has added on additional costs to doing business in the U.S. We would like to believe that better corporate governance should lead to better and safer investment opportunities. The main contribution of this paper is to provide evidence on the Sarbanes-Oxley Act and how it has affected firm value and cross-listing decisions worldwide using dynamic panel data methods and treatment effects methods. We presented empirical models using a sample of 31 countries where firms cross-listed in a major North-American, Asian and European market for the period 2000–2005.

First, we find that Sarbanes-Oxley (Sox) has had a consistent negative impact on the market value of firms in this period. This was identified either through a continuous set of time dummies or relative to firms that did not cross list prior to 2002. However, controlling for Sox makes identification of the cross-listing effect on firm's value difficult. The evidence from differences in means is that in Hong Kong the cross-listing premium is consistently negative in 2000–2005; in Germany it becomes negative after 2001; and in the U.S. after 2002. The dynamic panels show that Hong Kong commands a significant discount on the value of a firm cross-listing there, relative to firms that do not cross-list there. The already cross-listed firms in the U.S. in 2003 commanded a premium, due to the market perception of higher standards. The evidence from treatment effects confirms that Sarbanes-Oxley impacted negatively on the value of firms. However, the effect of Sox on the cross-listing decision is positive in the Hong Kong destination, and negative in the U.S. and Germany destination. In particular, the implementation of Sox in 2002 discouraged firms to cross-list in the U.S. in the following year.

In terms of the cross-listing decision, the evidence is in favor of crowding out the market where the accounting standards are better. However, our findings indicate that the firms that sought funds in Hong Kong after Sox were the low prospect ones (the ones with lower q), thus the crowding out effect reflects a selection problem: The introduction of the regulation has the perverse effect of inducing low prospect firms to seek funding abroad.

In summary, we find that Sarbanes-Oxley has had a negative impact on the value of firms worldwide; that Sox may have segmented markets, with many lower valued firms destined to Hong Kong, thus crowding out the market where regulation is more stringent; and that the implementation of Sox benefited firms already cross-listed in the U.S., but discouraged other firms to seek cross-listing in the U.S.

This study also has some advantages and limitations. The small time and large cross-sectional dimensions make the Arellano-Bond dynamic panel methodology appropriate. The first differences of the value of the firm also eliminate some potential firm characteristics that are constant through time. However, it is possible that the continuous time dummies (and single dummy) used mask other shocks beside the Sarbanes-Oxley. Given our evidence presented here, and that of Zhang (2007) and Litvak (2007), we find our results plausible. However, further controls on firm heterogeneity could be a fruitful avenue for future research to robustly identify the effects of Sox. Also, it would be useful to expand the number of firms, time period and origin and destination markets to better understand the cross-listing decision of firms and the impact of regulatory frameworks on firm value and cross-listing premium.

Appendix A.

See Table A1.

Table A1
Effective dates of Sox compliance regulation.

Section of Sox	Brief	Effective of compliance dates
201	Nonaudit services	Service contracted on or after May 6, 2003
202	Audit committee administration of the auditor engagement	Service contracted on or after May 6, 2003
203	Audit partner rotation	Service contracted on or after May 6, 2003
204	Auditor reports to the auditor committee	March 31, 2003
206	Auditor "cooling off" periods	March 31, 2003
301	Audit committee responsibilities and independent director requirement	July 31, 2005
302	CEO/CFO Certification	Certification due on or after August 14, 2003
303	Improper influence on audits	June 26, 2003
304	Compensation forfeit	July 30, 2003
306	Insider trades	March 31, 2003
307	Attorney responsibilities	Accommodations provided to foreign attorney
401	Off-balance sheet transactions disclosures	Fiscal year ending on or after June 15, 2003
401	Contractual obligations	Fiscal year ending on or after December 15, 2003
402	Loan prohibition	July 30, 2002
403	Section 16 forms	Securities registered by a private issuer are exempt from section 16
404	Internal controls	Extended to the fiscal year ending on or after July 15, 2006
406	Code of ethics	Fiscal year ending on or after June 15, 2003
407	Financial expert on audit committee	Fiscal year ending on or after June 15, 2003
806 and 1107	Whistleblower provisions	July 30, 2002
906	CEO/CFO certification	Certification due on or after August 14, 2003

Source: Small and Zhu (2007).

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