

Going Public and Being Public - A Global Comparison of the Impact of the Listing Decision on the Cost of Capital

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1. Executive Summary

The decision to go public is associated with a substantial cost for the firm. The authors have undertaken an independent analysis of the direct and indirect costs related to the decision of going and being public. Most importantly, this study focuses on the question to what extent these costs differ depending on the primary listing venue chosen by the firm. For that purpose six of the eight largest stock exchanges in the world have been analysed, namely Deutsche Börse, Euronext, Hong-Kong Stock Exchange, LSE, Nasdaq and Nyse. With the exception of Nasdaq and Nyse, all these exchanges have at least two different market segments targeted towards large resp. small cap firms. Therefore, most of the results will be presented also separately for these two market tiers. For the sake of completeness we decided to artificially split up the Nasdaq and Nyse market into a small cap segment (i.e. issues of up to 100 m€) and a large cap segment (issues beyond 100 m€).

Our findings show that in an international comparison the usage of equity financing via the stock market in Germany is relatively small, given the size of the German economy. To some extent this is due to Germany's unfunded public pension schemes. However, in terms of relative equity raising activities by domestic listed firms, the Deutsche Börse listing platform is quite strong. In fact, relative SEO activity, i.e. equity raised through seasoned equity offerings in percent of domestic market capitalization, at Deutsche Börse is larger than at LSE, Nyse or Nasdaq, although smaller than at Euronext or Hong-Kong Stock Exchange. Nevertheless, for listed firms the role of the Deutsche Börse listing platform as an equity financing channel is at least as important as for other presumably more equity oriented countries.

From the perspective of the issuer the six stock exchanges are analysed along different dimensions related to flotation costs, trading costs and listing fees. In order to allow for a comparison a scoring model is established, with these different variables as an input. It turns out that among the large cap market segments the Frankfurt Prime/General Standard seems to be the most attractive with a score of 2.0. Hong-Kong Main Board achieves a score of 2.9, while Nyse is at 3.0. Eurolist follows closely with a score of 3.1. The London Main Market gets a score of 3.4 and the Nasdaq of 3.5. As far as small cap market segments are concerned, the Frankfurt Entry Standard seems to be the most attractive with a score of 1.9. It is followed with a substantial distance by Nyse (Small Cap) and Alternext with a score of 2.6 resp. 2.8, while Nasdaq (Small Cap) gets a score of 3.0. Finally, AIM and the Hong-Kong GEM achieve a score of 3.4 resp. 3.5.

More specifically, the single results behind these overall scores can be summarized as follows:

The cost of going public

1. The average of the total IPO¹ flotation cost over the period 1999 to 2007 was 7.6% of gross offering proceeds at Euronext, 7.7% at Nyse, 8.3% at Deutsche Börse, 9.5% at Nasdaq, 12.6% at LSE and 14.6% at Hong-Kong Stock Exchange. The median flotation cost is a little bit lower, although the ranking among the listing venues on the ba-

¹ Note that the term "IPO" refers to "new issues" in the case of AIM.

sis of the median would be the same. By looking at the large cap segments the average total flotation cost is as follows: 7.0% at Eurolist, 7.5% at the Frankfurt Prime/General Standard, 7.4% at Nyse, 8.0% at Nasdaq, 8.9% at the London Main Market and 10.9% at the Hong-Kong Main Board. For the small cap market segments the results are the following: Alternext 8.5%, Entry Standard 9.5%, Nasdaq and Nyse small cap issues 10.1%, AIM 17.0% and GEM 20.3%. Basically, these results are corroborated when controlling for the impact of issue size by using a standard linear regression approach. However, not all of these differences turn out to be statistically significant.

2. Total flotation costs can be split-up into underwriting fees, i.e. fees paid to the investment banks, and non-underwriting fees, i.e. fees paid to lawyers and auditors as well as other expenses incurred during the offering process. For the median non-underwriting fees the results are as follows: Nyse 1.2%, Euronext 1.9%, Nasdaq 2.1%, Deutsche Börse 2.6%, LSE 4.9% and Hong-Kong Stock Exchange 10.0%. Interestingly it turns out that non-underwriting fees have significantly increased in the US since 2004. This might be a consequence of the new legislation enacted with the Sarbanes Oxley Act. For the median underwriting fees we find: Hong-Kong Stock Exchange 2.5%, LSE 3.3%, Euronext 3.6%, Deutsche Börse 4.8%, Nyse 6.5% and Nasdaq 7%. Again, the results are corroborated by a linear regression analysis although, by controlling for the size effect, not all of these differences are statistically significant.
3. Admission fees differ quite substantially across the stock exchanges under consideration. For large cap companies Eurolist, LSE and Nyse are the most expensive market segments, while the Frankfurt Prime/General Standard is the most favourable by far. As far as growth markets are concerned similar considerations apply, although Nasdaq and Nyse turn out to be the most expensive exchanges in this segment. Again, the Frankfurt Entry Standard is the most favourable by far.
4. As far as indirect costs in form of underpricing are concerned, we evaluate medium range as overall most attractive. Very small underpricing will induce only limited interest of investors to sign IPOs, and in the case of extreme underwriting newly listed firms leave too much money on the table. Our findings document average first listing day returns in Frankfurt which are most closely to our ideal benchmark.

The cost of being public

5. According to the empirical evidence presented in this study mean SEO underwriting fees equal 2.0% at Hong-Kong Stock Exchange, 2.1% at LSE, 3.0% at Deutsche Börse, 3.5% at Euronext, 3.8% at Nyse and 5.2% at Nasdaq.
6. It turns out that there has been a substantial change in Germany as far as SEO underwriting fees are concerned. According to the data presented in this study median underwriting fees are equal to 3%, while a study looking at the period 1993 to 1998 recorded median underwriting fees of 1% in Germany. It may be that the upward shift in underwriting fees may be related to the fact that bookbuilding offerings have become more popular in Germany over the last years. However, it should be noted that due to EU regulation smaller seasoned equity offerings are often exempted from the obligation to publish a prospectus. Due to this the European stock exchanges related data base for SEOs is quite small.

7. The difference in listing fees is quite substantial, although not as pronounced as for admission fees. Again, for large cap firms the Prime/General Standard is most attractive under this dimension, while Nyse and Nasdaq are most expensive. For growth firms the differences among the European exchanges are quite small, while Nasdaq and Nyse are again substantially more expensive.
8. While investors maximize net stock returns, companies have to calculate with gross returns as required costs of capital. The difference between gross returns and net returns contain trading costs. These trading costs consist of explicit and implicit cost components. We show that at the Prime/General Standard (Entry Standard) in Frankfurt the overall trading costs tend to be slightly lower than at Nyse and Eurolist. However, they are significantly lower compared to Main Market (AIM) in London, using recent trading data of new equities. The firm characteristics of new listings in Germany compared to the Eurolist countries, the UK and the US show some remarkable differences. Larger in size, new equities at the Eurolist, the Main Market and Nyse have a higher ratio of days without any trading than Prime/General Standard IPOs. The new issues at the AIM have significantly higher average market values than Alternext, Entry Standard and GEM IPOs but average trading volumes are remarkably lower and days without trading more often at AIM compared to the Entry Standard. Controlling for these firm characteristics the implicit trading costs (measured by the bid-ask spreads) are the lowest at GEM and the Entry Standard followed by the Hong-Kong Main Board, Nasdaq and the Prime/General Standard. Consistent with other studies we find extremely high implicit trading costs at Alternext and the AIM. Hence, it seems that Alternext and AIM are unattractive expensive listing alternatives from a trading cost perspective compared to an IPO at Deutsche Börse.

2. Introduction and framework

2.1 General remarks on European public equity markets

It is well known that the number of listed German companies is small relative to the size of the German economy. This relative size is commonly measured as the ratio of the market capitalization of listed domestic firms to the gross domestic product (GDP). As can be seen from Figure 1, the average of this ratio over the period 2000–06 was close to 50% for the German stock market, while it was more than 85% for the Euronext market and over 135% for both the US and UK.

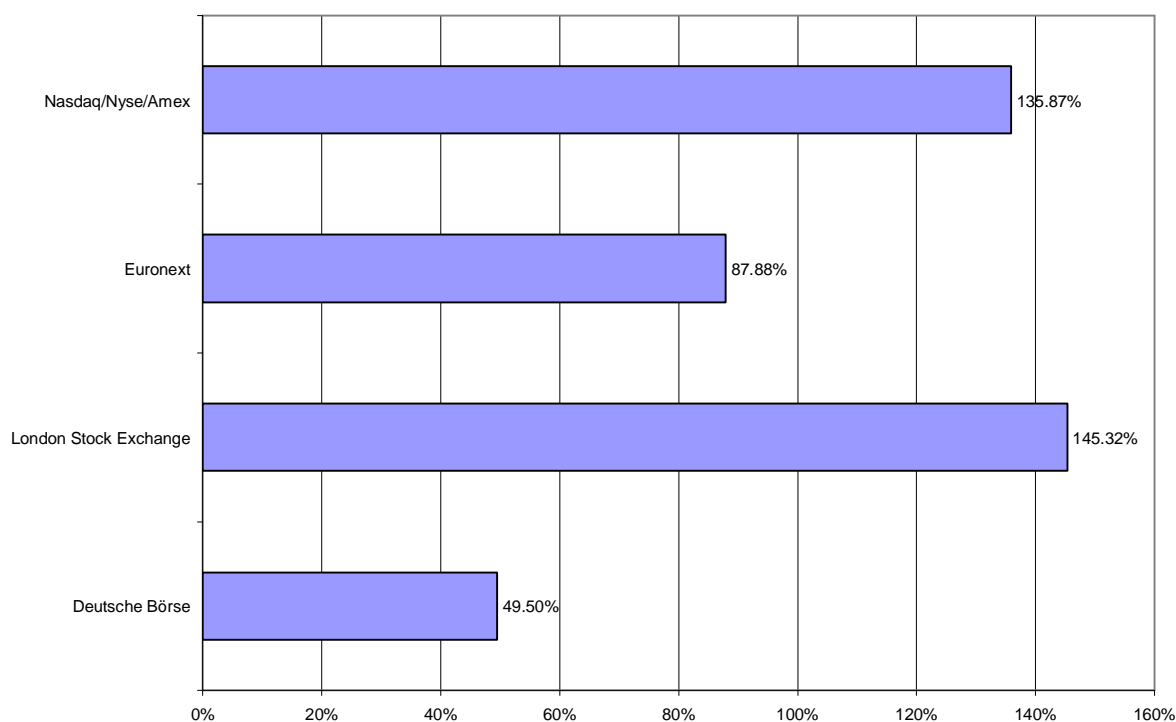


Figure 1: Average domestic stock market capitalization in percent of GDP for different stock markets for the period 2000-2006

Source: WFE, OECD, IMF

There is an ongoing debate with respect to the reasons for this large difference. Most prominently, the legal system in terms of investor protection is discussed as well as the fact that Germany's unfunded public pension scheme prevents a consistent part of economic savings from being channelled through the stock market.² However, in absolute terms the financing role of the German equity market is not as pronounced as the role of other markets, like those in the Anglo-Saxon world.

It is interesting to note in this context that Continental European stock markets experienced a strong increase in relative stock market size since the beginning of the nineties. While the

² For a more detailed discussion of this issue cf. La Porta/Lopez-de-Silanes/Shleifer/Vishny (2000), Investor protection and corporate governance, *Journal of Financial Economics* 58, pp. 1-25, or Wenger/Kaserer (1998), German Banks and Corporate Governance: A Critical View, in: *Comparative Corporate Governance. The State of the Art and Emerging Research*, Hopt/Kanda/Roe/Wymeersch/Prigge (eds.), Clarendon Press, pp. 499-536.

ratio of German domestic stock market capitalization to GDP was slightly above 20% over the period 1990-94, it increased close to 50% over the period 2000-06. Similarly, also the ratios for the Euronext countries grew significantly. While the UK and US stock market capitalization also increased perceptibly compared with the beginning of the nineties, there has been stagnancy in relative stock market size over the last decade.

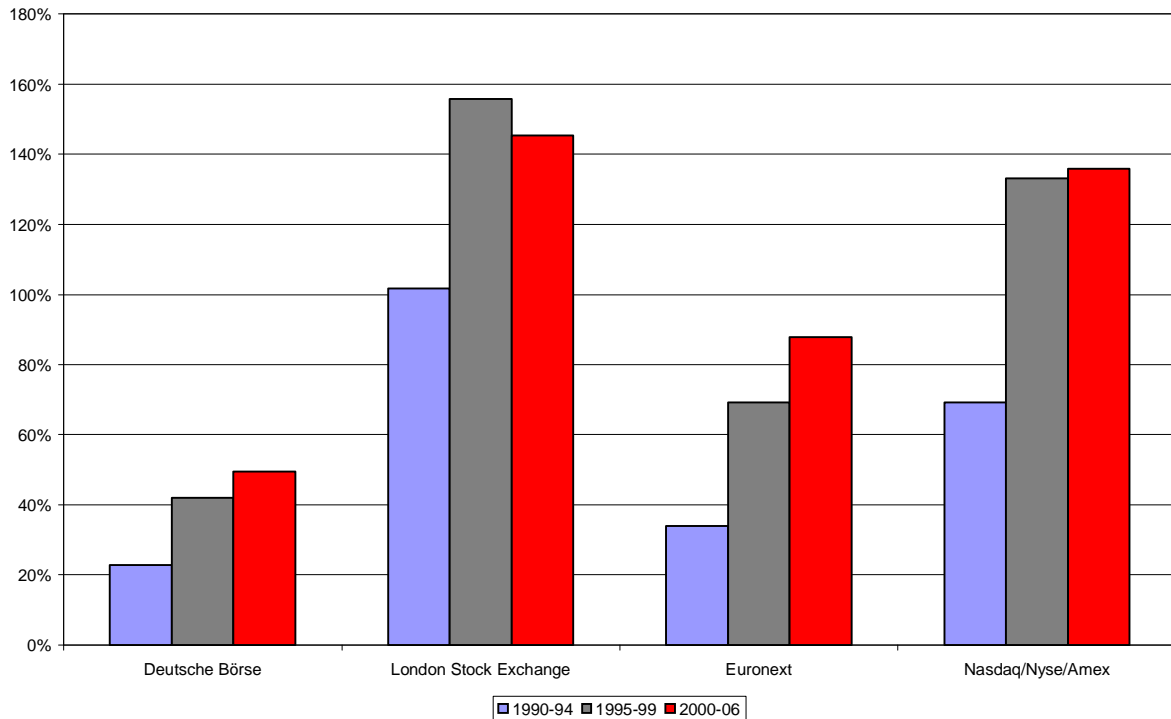


Figure 2: Average domestic stock market capitalization in percent of GDP for different stock markets and different time periods

Source: WFE, OECD, IMF

In terms of relative equity raising activities by domestic listed firms, the German stock market is consistently stronger than the UK stock market. In fact, as can be seen from Figure 3, over the period 2000–2006 German listed firms raised on average new equity equal to 1.4% of their market capitalization; for the London Stock Exchange as well as Nasdaq this figure was equal to 0.9% and for Nyse only 0.7%. Hence, for German listed firms the role of the stock market as an equity financing channel is at least as important as for listed companies in other presumably more equity oriented countries. However, the highest relative seasoned equity offerings (SEOs) activity is recorded for the Hong-Kong stock exchange.

The picture is different for equity raised through new issues. As documented in Figure 4, the relative going public activity in Germany has slowed down over the period 2000-06 compared with the period 1995-99. This is mostly due to the fact that the German IPO market suffered from a serious downturn in 2003, when there was not a single issue. This is the reason why among the stock exchanges considered here, relative IPO-activity was rather small in Germany over the period 2000-06. However, even through this difficult period the new issue activity at Deutsche Börse in relative terms was larger than at Nyse or Nasdaq. Moreover, if one looks at relative new issue activity in the year 2006, Deutsche Börse is as large as Euronext,

but still smaller than LSE or HKEX. By and large, these figures make clear that the financing role of the German stock exchange is appealing, provided that the smaller size of the market as a whole is taken into account.

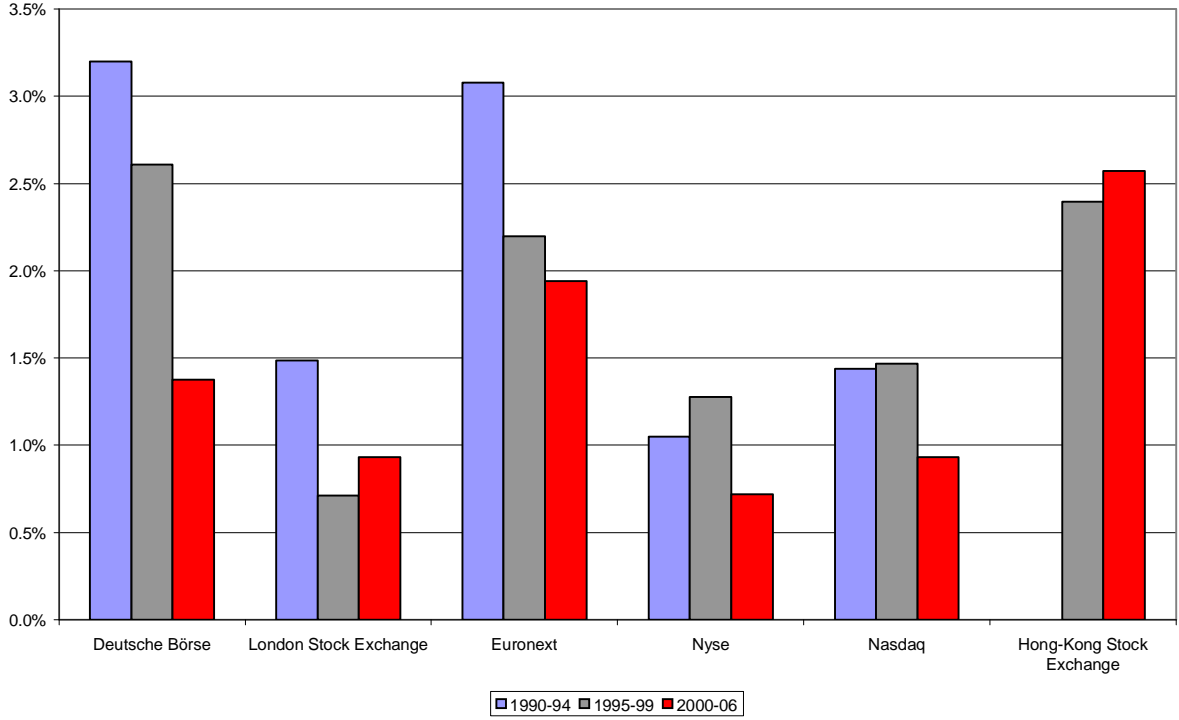


Figure 3: Equity raised through SEOs by domestic firms in percent of domestic market capitalization

Source: WFE, own calculations (no data available for Hong-Kong for the period 1990-1995)

As a final point in this context, we would like to emphasize that there is a global shift in new issue activity. While for a very long period, new issue volume was by far larger at Nyse and Nasdaq than at the three largest European exchanges altogether, i.e. Deutsche Börse, LSE and Euronext, this has changed since 2005. In fact, as can be seen in Figure 5, equity raised through new issues was almost the same at Nyse and Nasdaq compared with the largest European exchanges in 2005, while the latter overhauled the former in 2006 by far.

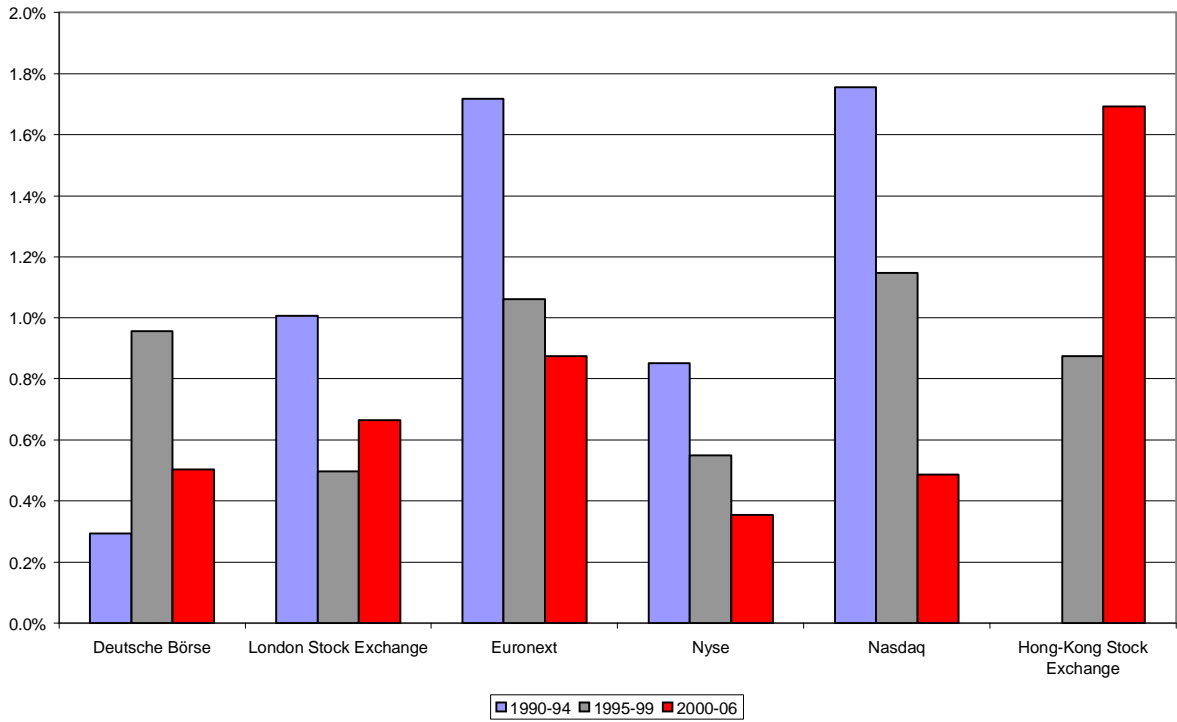


Figure 4: Equity raised through new issues by domestic firms in percent of domestic market capitalization

Source: WFE, own data (no data available for Hong-Kong for the period 1990-1995)

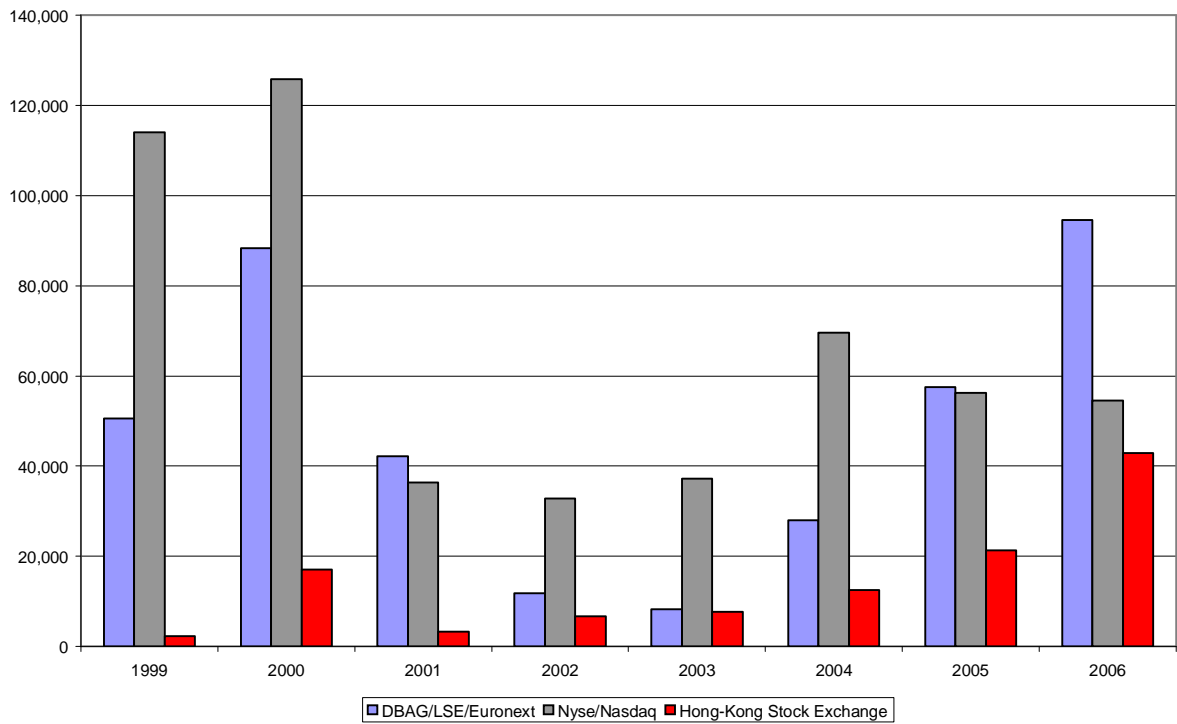


Figure 5: Equity raised through new issues in m€ by different world regions

Source: WFE, own data

2.2 The cost of capital framework

If a company decides to go public, then it incurs two different types of costs, which are illustrated in Figure 6: (a) the costs associated directly with the IPO, i.e. the costs of going public, and (b) the costs associated with being a listed firm including the costs associated with a future seasoned equity offering (SEO). According to the financial economics literature these costs are split-up in direct and indirect components. As direct costs all expenses related to the listing decision are considered. Most importantly, underwriting fees paid to the lead investment bank as well as to lawyers and auditors are major items belonging to the direct costs. Other direct costs components are fees paid to the stock exchange, advertising and press costs and expenses incurred to comply with disclosure and corporate governance rules. The most prominent indirect costs component is the impact of the listing decision on the equity valuation.

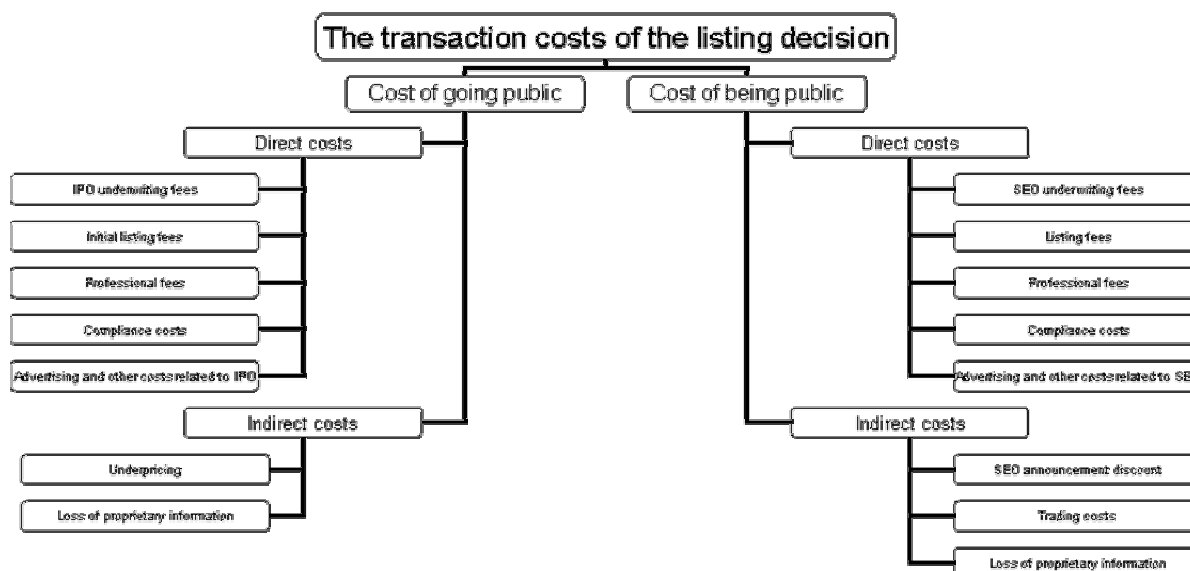


Figure 6: Direct and indirect transaction costs associated with the listing decision³

In the preceding study of Kaserer/Schiereck (2006)⁴ a formal framework for analysing the impact of the cost of going or being public on the overall cost of capital of a company has been developed. Such a framework allows putting different cost items in relation to each other by quantifying their impact on the overall cost of capital of the company. This is vital, as different markets might have cost advantages for some items and disadvantages for others. Comparing these markets necessarily implies the need to figure out, what the overall impact on the firm's cost of capital will be. As the (academically) interested reader could easily apply the results presented here to that formal model, we decided not to repeatedly present this

³ Cf. also Oxera (2006), *The Cost of Capital – An International Comparison*, Oxford, p. 14.

⁴ Cf. Kaserer/Schiereck (2006), *Deutsche Börse: Going Public and Being Public. The Impact of the Listing Decision on the Cost of Capital – An International Comparison*, Frankfurt.

model again in this follow-on study. Instead, we propose a simpler scoring model that allows making a comparison between different stock exchanges along the different cost items presented in Figure 6. The reason for doing so is the following: The formal cost of capital framework developed by Kaserer/Schiereck (2006) suffers from the drawback that it is not possible to integrate all the cost dimensions in the analysis. For instance, as there is no widely accepted theoretical model explaining the impact of stock trading costs on the firm's equity cost, we were not able to integrate this specific cost dimension into our formal model. For this study we decided, therefore, to use a qualitative scoring model based on all relevant cost dimensions. The structure of this scoring model will be explained in section 5.

It should be noted that two indirect cost items are not included in our scoring model. More specifically, we neither consider the impact of the listing venue on the underpricing nor on the equity valuation in general. Of course, it could be argued that because of adverse selection or moral hazard issues the firm has to offer its stocks at a discount, leading to the well known phenomenon of underpricing, in case of an IPO, or a negative announcement reaction of the stock price in case of a SEO.⁵ Although these kind of indirect costs have to be taken into account for the decision whether to raise equity on public markets, it is rather questionable whether the listing venue may have any influence on these indirect costs.⁶ According to recent evidence presented by behavioural economists, it is even questionable whether companies are able to manage underpricing at all. In fact, there is evidence that the underpricing phenomenon is driven by market sentiment, at least to some extent. In fact, new shares issued during hot market periods are more likely to suffer from long-run underpricing than shares offered in less optimistic markets.⁷ Similar considerations apply to the stock market reactions to SEO announcements. Although we will present pertinent empirical evidence in this study, we strongly doubt that these type of indirect costs are a manageable cost component associated with the listing venue.

Evidently, the evaluation is totally different as far as trading costs are concerned. The transaction costs that are induced by the investors' buy and sell orders reduce the gross returns of equity investments. As investors maximize the net returns of their portfolio trades, transaction costs influence the required gross returns of companies that raise equity via the stock market.⁸ The higher the transaction costs the higher the required gross returns for equity raising companies. Domowitz/Steil (2001) estimate that a 10% increase in transaction costs will lead to a 1.4 to 1.7% increase in the post-tax cost of equity capital. Consistently with this estimate a number of empirical studies observe a positive relationship between returns and trading costs.⁹

⁵ These are two well documented phenomena in corporate finance; for an overview cf. Berk/De Marzo (2007), *Corporate Finance*, Boston et al., pp. 757 n.

⁶ To the extent that disclosure rules are different on different stock exchanges there may be such an impact. However, it would be extremely difficult to isolate the value effect of specific disclosure rules. Moreover, it should be noted that on EU-regulated market these differences are quite small.

⁷ Cf. Ljungqvist/Nanda/Singh (2006), Hot markets, investor sentiment, and IPO pricing, *Journal of Business* 79, pp. 1667-1702, and Lowry/Schwert (2002), IPO market cycles: bubbles or sequential learning?, *Journal of Finance* 57, pp. 1171-1200.

⁸ See e.g. Amihud/Mendelson (1986), Asset Pricing and the Bid-Ask Spread, *Journal of Financial Economics* 17, pp. 223-249.

⁹ Consistent with the „liquidity hypothesis“ the following authors provide supporting empirical evidence: Amihud/Mendelson (1989), The Effects of Beta, Bid-Ask Spread, Residual Risk, and Size on Stock Returns, *Journal of Finance* 44, pp. 479-486, Eleswarapu (1997), Cost of Transacting and Expected Returns in the Nasdaq Market, *Journal of Finance* 52, pp. 2113-2127, Brennan/Subrahmanyam (1996), Market Microstructure and Asset Pricing, *Journal of Financial Economics* 41, pp. 441-464, Amihud/Mendelson/Lauterbach (1997), Market microstructure and securities values: Evidence from the Tel Aviv Stock Exchange, *Journal of Financial Economics* 45, pp. 365-390, Domowitz/Glen/Madhavan (2001), Liquidity, Volatility and Equity Trading Costs Across Countries and Over Time, *International Finance* 4, pp. 221-255.

3. The cost of going public

3.1 Direct costs

3.1.1 IPO flotation costs

It has been shown in Figure 6 that the direct cost of going public can be split-up in underwriting fees, professional fees, initial listing costs, compliance costs, and advertising and other costs. While underwriting fees regularly are disclosed in the prospectus, it is not that clear how to get reliable information on the other cost items. However, in some cases the prospectus gives information about underwriting and non-underwriting costs. It can be assumed that non-underwriting fees reflect professional fees, initial listing costs, advertising costs, and other expenses directly related to the IPO. Of course, to the extent that an IPO generates internal costs, e.g. because the financial department of the company has to be increased due to new disclosure rules it has to comply with, they are not disclosed in the prospectus. Hence, one should be aware that a comprehensive estimation of non-underwriting flotation costs is certainly not possible.

	No. of new issues	Mean issue volume m€	Median issue volume m€
Deutsche Börse	148	187.196	47.600
Prime/General Standard	54	321.379	94.223
Neuer Markt	75	134.271	45.394
Entry Standard	19	14.745	13.500
Euronext	106	252.224	15.500
Eurolist	66	398.869	56.530
Alternext	40	10.258	9.000
Hong-Kong Stock Exchange	334	125.827	13.509
Main Board	202	196.018	37.879
GEM	132	18.413	7.057
London Stock Exchange	300	137.058	38.652
Main Market	164	216.100	83.812
AIM	136	41.742	10.313
Nasdaq	1,069	98.318	66.858
Large Caps (>100 m€)	285	213.719	148.152
Small Caps (<=100 m€)	784	56.368	54.821
Nyse	342	439.070	209.575
Large Caps (>100 m€)	298	492.517	242.998
Small Caps (<=100 m€)	44	77.084	75.420
All	2,299	170.878	67.096

Table 1: New issues analyzed in this study covering the period 01/01/1999 to 31/03/2007¹⁰

In order to make an empirical assessment of the IPO flotation costs at Deutsche Börse, London Stock Exchange, Euronext, Nyse, Nasdaq and Hong-Kong Stock Exchange data from

¹⁰ IPOs that have taken place before the introduction of the Prime Standard and General Standard segments in the year 2003 at Deutsche Börse were subsumed under these two segments, if the new shares were listed under the rules of the segments Amtlicher Handel or Regulierter Markt.

prospectuses or registration documents has been collected.¹¹ With the exception of Nyse and Nasdaq all these exchanges have different market segments for large and small cap firms, which will be put under a separate scrutiny in this study. For the sake of completeness we artificially define the Nasdaq and Nyse small (large) cap segment consisting of those IPOs with an issue volume of up to (larger than) 100 m€ Specifically, we recorded information on gross proceeds and total IPO flotation costs. In some cases information about gross spreads paid to the lead investment bank, i.e. underwriting fees, and other expenses, i.e. non-underwriting fees, were disclosed separately. Unfortunately, for the European new issues this additional information could be recorded only exceptionally. Data has been collected from the Thomson One Banker database as well as from hand-collected prospectuses or registration documents available at the websites of the stock exchanges, the financial supervision authority or the company itself. A total of 2,299 new issues could be collected in this way. A resume of the data is given in Table 1. As one can see, roughly 60% of the new issues in the sample are related to the US market, while about 25% are related to the European stock market. This bias in favour of the US market is simply related to the fact that data availability is much better there.¹²

3.1.1.1 *Deutsche Börse*

The results with respect to IPOs at Deutsche Börse are resumed in Table 2 and Table 3. As one can see, the mean total flotation costs are equal to 8.30% which is a slight reduction compared with the average of 8.72% recorded in Kaserer/Schiereck (2006). Kaserer/Kraft (2003) reported slightly smaller total flotation costs for German new issues over the period 1993-99 of 7.77%.¹³ The median firm incurs a cost of 7.88% of gross offering proceeds, which is very close to the 7.98% presented in Kaserer/Schiereck (2006) and to the 7.30% presented in Kaserer/Kraft (2003). Interestingly, for the subsample of 43 firms, where we have been able to collect information on the gross spread, the median underwriting fees are equal to 4.75%, which is slightly lower than the 5.00% presented in Kaserer/Kraft (2003). The median non-underwriting fees are equal to 2.61%, which is perceptibly higher than the 2.16% presented in Kaserer/Kraft (2003). Although no clear conclusion about any time pattern can be drawn from this, it might be that the slight increase in total flotation costs since the nineties is caused by an increase in the other expenses rather than in the underwriting fees.

Moreover, it can be seen that flotation costs are lower at the Prime/General Standard segment compared with the Entry Standard. This is mainly due to a size effect¹⁴, as can be seen from Table 3. There, the flotation costs for different size brackets are presented. As expected, flota-

¹¹ As far as the new issues at Deutsche Börse as well as London Stock Exchange over the period 1999-2006 are concerned, we are using the same data as in Kaserer/Schiereck (2006). Moreover, it should be noted that especially at AIM most of the new issues did not publish a prospectus, as these stock offerings are taking place outside the EU-regulated market. Strictly speaking such offerings are not IPOs. Nevertheless, in the following we use the term IPO as a synonym for any new issue of stocks, unless stated otherwise.

¹² The reader should note that the total number of IPOs at the Nyse and Nasdaq market is pretty larger than the number of issues taken into consideration here. The sample has been constructed via a random sampling process. For the other exchanges we have taken all the new issues where we have been able to collect at least the IPO data, offering proceeds as well as total flotation costs.

¹³ Cf. Kaserer/Kraft (2003), How issue size, risk, and complexity are influencing external financing costs - German IPOs analyzed from an Economies of Scale Perspective, *Journal of Business Finance and Accounting* 30, pp. 479-512.

¹⁴ For an academic discussion of the existence of economies of scale in the investment banking technology cf. Kaserer/Kraft (2003), How issue size, risk, and complexity are influencing external financing costs - German IPOs analyzed from an Economies of Scale Perspective, *Journal of Business Finance and Accounting* 30, pp. 479-512.

tion costs monotonically decrease with larger issue size.¹⁵ While in the highest size bracket average flotation costs sum up to 4.86%, they are almost twice as high for the companies in the smallest size bracket.

		N	Mean	Weighted Mean	Median
Gross offering proceeds m€	All	148	187.196		47.600
	Prime/General	54	321.379		94.223
	Neuer Markt	75	134.271		45.394
	Entry	19	14.745		13.500
Total flotation costs	All	148	8.30%	5.33%	7.88%
	Prime/General	54	7.52%	4.80%	6.60%
	Neuer Markt	75	8.56%	6.15%	8.29%
	Entry	19	9.48%	8.78%	8.23%
Other Expenses	All	43	3.38%	2.31%	2.61%
Gross spread	All	43	4.62%	3.23%	4.75%

Table 2: IPO flotation costs in percent of gross offering proceeds at Deutsche Börse over the period 01/01/1999 to 31/03/2007

		N	Mean	Weighted mean	Median
0-100 m€	other expenses	28	3.86%	3.18%	3.03%
	gross spread	28	5.22%	5.10%	5.00%
	total costs	110	9.03%	8.37%	8.47%
100-250 m€	other expenses	5	2.21%	1.88%	1.49%
	gross spread	5	4.85%	4.98%	4.25%
	total costs	15	7.56%	7.12%	5.65%
250-500 m€	other expenses	3	3.27%	3.36%	2.47%
	gross spread	3	3.00%	2.89%	3.25%
	total costs	11	5.69%	5.79%	4.74%
Over 500 m€	other expenses	7	2.34%	2.01%	2.81%
	gross spread	7	2.74%	2.73%	3.00%
	total costs	12	4.86%	4.08%	4.76%

Table 3: IPO flotation costs in percent of gross offering proceeds at Deutsche Börse over the period 01/01/1999 to 31/03/2007 for different size brackets

Finally it should be noted that we do not find any evidence for a clustering of gross spreads on

¹⁵ This is not true for all subsamples in Table 3; most probably this is due to the fact that for some subsamples the number of observations is extremely small.

the German market.¹⁶ The mode¹⁷ of the underwriting spread is 5%; however, in only 14% of the cases the gross spread was exactly equal to the mode.

3.1.1.2 London Stock Exchange

The results with respect to new issues at London Stock Exchange are resumed in Table 4 and Table 5. As one can see, the mean total flotation costs are equal to 12.59% which is an increase of almost one percentage point compared with the average of 11.67% recorded in Kaserer/Schiereck (2006). The median firm incurs a cost of 9.94% of gross offering proceeds, which is close to the 9.75% presented in the preceding study. For the subsample of 48 firms, where we have been able to collect the relevant information, the median non-underwriting fees are equal to 4.86%, while the median gross spread is equal to 3.25%. It should be noted that these results are in line with results presented by Oxera (2006).¹⁸ By using a recent sample of 84 IPOs covering the period 2003 to 2005 they find an average spread of 3.6%. The mode of the underwriting spread is 3%, but again only a relatively small fraction of 17% of the issues under consideration had a gross spread exactly equal to that figure. Not surprisingly, the flotation costs are lower at the Main Market segment compared with the Alternative Investment Market (AIM). This is mainly due to a size effect, as can be seen from Table 5. There, the flotation costs for different size brackets are presented. As expected, flotation costs monotonically decrease with larger issue size. While in the highest size bracket average flotation costs sum up to 6.23%, they are equal to 14.87%, i.e. more than twice as high, for the companies in the smallest size bracket.

		N	Mean	Weighted Mean	Median
Gross offering proceeds m€	All	300	137.058		38.652
	Main Market	164	216.100		83.812
	AIM	136	41.742		10.313
Total flotation costs	All	300	12.59%	7.13%	9.94%
	Main Market	164	8.91%	7.04%	7.80%
	AIM	136	17.02%	7.66%	12.70%
Other Expenses	All	48	5.33%	4.93%	4.86%
Gross spread	All	48	3.60%	2.93%	3.25%

Table 4: IPO flotation costs in percent of gross offering proceeds at London Stock Exchange over the period 01/01/1999 to 31/03/2007

¹⁶ It has been argued in the literature that gross spreads are clustered at some widely accepted figures. For instance, the so called 7%-rule is a well documented phenomenon for the US; cf. Hansen (2001), Do Investment Banks Compete in {IPOs}?: The Advent of the '7% plus contract', *Journal of Financial Economics* 59, pp. 313-346. Torstila (2001), What determines the IPO gross spreads in Europe, *European Financial Management* 7, pp. 523-541, documents that clustering is not a widespread phenomenon in European IPOs.

¹⁷ The mode is the most frequent value assumed by a random variable.

¹⁸ Oxera (2006), *The cost of capital: An international comparison*, Oxford.

		N	Mean	Weighted mean	Median
0-100 m€	other expenses	17	7.79%	7.58%	7.15%
	gross spread	17	3.50%	3.29%	3.50%
	total costs	214	14.87%	10.14%	11.18%
100-250 m€	other expenses	16	3.68%	3.60%	3.16%
	gross spread	16	4.18%	4.01%	4.19%
	total costs	51	7.15%	7.05%	6.87%
250-500 m€	other expenses	6	3.72%	2.70%	3.74%
	gross spread	8	3.32%	3.27%	3.25%
	total costs	17	6.87%	6.03%	6.39%
Over 500 m€	other expenses	9	4.71%	5.20%	4.93%
	gross spread	9	2.85%	2.63%	3.00%
	total costs	18	6.23%	6.52%	5.83%

Table 5: IPO flotation costs in percent of gross offering proceeds at London Stock Exchange over the period 01/01/1999 to 31/03/2007 for different size brackets

3.1.1.3 Euronext

The results with respect to new issues at Euronext are resumed in Table 6 and Table 7. As one can see, the mean total flotation costs are equal to 7.56%. The median firm incurs a cost of 6.58% of gross offering proceeds. For the subsample of 38 firms, where we have been able to collect the relevant information, the median non-underwriting fees are equal to 1.86% while the median gross spread is equal to 3.60%. Again, no clustering in gross spreads can be detected as the mode doesn't even exist. Not surprisingly the flotation costs are lower at the Eurlist segment compared with the Alternext segment. This is mainly due to a size effect, as can be seen from Table 7. As expected, flotation costs decrease in issue size.¹⁹ While in the higher size bracket average flotation costs sum up to 3.92%, they are equal to 8.46%, i.e. more than twice as high, for the companies in the lower size bracket.

¹⁹ Note that due to the concentration of more than 80% for all issues in the size bracket going up to 100 m€, it makes no sense to record the figures for the same grid as was done in Table 3 and Table 5.

		N	Mean	Weighted Mean	Median
Gross offering proceeds m€	All	106	252.224		15.500
	Eurolist	66	398.869		56.530
	Alternext	40	10.258		9.000
Total flotation costs	All	106	7.56%	4.15%	6.58%
	Eurolist	66	6.96%	4.11%	5.43%
	Alternext	40	8.55%	6.74%	7.56%
Other Expenses	All	38	2.86%	1.59%	1.86%
Gross spread	All	38	4.81%	2.51%	3.60%

Table 6: IPO flotation costs in percent of gross offering proceeds at Euronext over the period 01/01/1999 to 31/03/2007

		N	Mean	Weighted mean	Median
0-100 m€	other expenses	26	3.56%	2.25%	2.30%
	gross spread	26	5.79%	3.95%	4.24%
	total costs	85	8.46%	6.33%	7.50%
Over 100 m€	other expenses	12	1.36%	1.56%	1.40%
	gross spread	12	2.70%	2.46%	2.65%
	total costs	21	3.92%	3.98%	4.01%

Table 7: IPO flotation costs in percent of gross offering proceeds at Euronext over the period 01/01/1999 to 31/03/2007 for different size brackets

3.1.1.4 *New York Stock Exchange*

The results with respect to IPOs at the New York Stock Exchange are resumed in Table 8. As one can see, the mean total flotation costs are equal to 7.72%. The median firm incurs a cost of 7.73% of gross offering proceeds. For the Nyse we have been able to record non-underwriting fees for the whole sample. Median non-underwriting fees are equal to 1.22%. The median gross spread is equal to 6.50%, the mode is equal to 7%. It turns out that in one third of all issues the gross spread is exactly equal to 7%. Hence, at Nyse a strong clustering-effect is present.²⁰

In order to get an idea to what extent flotation costs are affected by a size effect, Table 8 splits up the data in different size brackets. First we differentiate between small and large caps by looking at issues with gross proceeds of up to resp. more than 100 m€ Second, we split up the large issue sample in additional size brackets. Once again, it can be shown that flotation costs

²⁰ This is in accordance with the findings of Hansen (2001), Do Investment Banks Compete in {IPOs}?: The Advent of the '7% plus contract', Journal of Financial Economics 59, pp. 313-346.

monotonically decrease in size. While in the highest size bracket (larger than 500 m€) average flotation costs sum up to 5.53%, they are equal to 10.05%, i.e. almost twice as high, for the small cap size bracket (up to 100 m€).

		N	Mean	Weighted mean	Median
All	gross offering proceeds m€	342	439.070		209.575
	other expenses	342	1.57%	0.94%	1.22%
	gross spread	342	6.15%	5.10%	6.50%
	total costs	342	7.72%	6.04%	7.73%
0-100 m€	other expenses	44	3.12%	3.13%	3.26%
	gross spread	44	6.93%	6.91%	7.00%
	total costs	44	10.05%	10.04%	9.83%
Over 100 m€	other expenses	298	1.34%	0.84%	1.08%
	gross spread	298	6.04%	4.99%	6.25%
	total costs	298	7.37%	5.83%	7.60%
100-250 m€	other expenses	153	1.75%	1.70%	1.54%
	gross spread	153	6.61%	6.60%	7.00%
	total costs	153	8.36%	8.30%	8.33%
250-500 m€	other expenses	79	1.06%	1.05%	0.91%
	gross spread	79	5.96%	5.93%	6.00%
	total costs	79	7.02%	6.98%	7.00%
Over 500 m€	other expenses	66	0.72%	0.58%	0.55%
	gross spread	66	4.81%	4.31%	4.76%
	total costs	66	5.53%	4.89%	5.55%

Table 8: IPO flotation costs in percent of gross offering proceeds at Nyse over the period 01/01/1999 to 31/03/2007 for different size brackets

3.1.1.5 Nasdaq

The results with respect to IPOs at the Nasdaq are resumed in Table 9. As one can see, the mean total flotation costs are equal to 9.54%. The median firm incurs a cost of 9.03% of gross offering proceeds. As for the Nyse-sample, also for the Nasdaq-sample we have been able to record non-underwriting fees for all the issues under consideration here. Median non-underwriting fees are equal to 2.07%. The median and mode gross spread is equal to 7%, which is not surprising as in 87% of the issues the gross spread was exactly 7%. This once again confirms the 7%-rule prevalent in the US investment banking industry.

In order to get an idea to what extent flotation costs are affected by a size effect, Table 9 again splits up the data in different size brackets.²¹ As already emphasized, also for the Nasdaq flotation costs monotonically decrease in issue size. While in the highest size bracket average flotation costs sum up to 6.63%, they are equal to 17.63% for the companies in the lowest size bracket, which means higher by a factor of 2.7 compared with the costs for the companies in the highest size bracket.

		N	Mean	Weighted mean	Median
All	gross offering proceeds m€	1,069	98.318		66.858
	other expenses	1,069	2.63%	1.75%	2.07%
	gross spread	1,069	6.91%	6.52%	7.00%
	total costs	1,069	9.54%	8.27%	9.03%
0-100 m€	other expenses	784	3.11%	2.66%	2.49%
	gross spread	784	6.99%	6.98%	7.00%
	total costs	784	10.10%	9.64%	9.48%
Over 100 m€	other expenses	285	1.32%	1.07%	1.16%
	gross spread	285	6.69%	6.17%	7.00%
	total costs	285	8.02%	7.24%	8.06%
0-20 m€	other expenses	31	10.55%	10.67%	6.67%
	gross spread	31	7.08%	7.05%	7.00%
	total costs	31	17.63%	17.71%	13.67%
20-50 m€	other expenses	305	3.56%	3.47%	3.24%
	gross spread	305	6.97%	6.98%	7.00%
	total costs	305	10.54%	10.45%	10.14%
50-100 m€	other expenses	448	2.29%	2.24%	1.98%
	gross spread	448	6.99%	6.98%	7.00%
	total costs	448	9.27%	9.22%	8.96%
100-250 m€	other expenses	241	1.44%	1.40%	1.25%
	gross spread	241	6.83%	6.81%	7.00%
	total costs	241	8.27%	8.20%	8.18%
Over 250 m€	other expenses	44	0.68%	0.65%	0.63%
	gross spread	44	5.95%	5.32%	6.00%
	total costs	44	6.63%	5.96%	6.77%

Table 9: IPO flotation costs in percent of gross offering proceeds at Nasdaq over the period 01/01/1999 to 31/03/2007 for different size brackets

²¹ Because of the high concentration in the size bracket up to 100 m€, we decided to use different size brackets in Table 9 as compared to the former tables.

3.1.1.6 Hong-Kong Stock Exchange

The results with respect to new issues at the Hong-Kong Stock Exchange are resumed in Table 10 and Table 11. As one can see, the mean total flotation costs are equal to 14.62%. The median firm incurs a cost of 12.71% of gross offering proceeds. Also for the Hong-Kong-sample we have been able to record non-underwriting fees for all the issues under consideration here. Median non-underwriting fees are equal to 9.96% and, therefore, extremely high. The median gross spread is 2.5% which is equal to the mode. Also at the Hong-Kong Stock Exchange there is a substantial clustering as in 50% of the issues the spread was exactly equal to 2.5%.

In order to get an idea to what extent flotation costs are affected by a size effect, Table 11 splits up the data in different size brackets.²² Once again, it can be shown that flotation costs monotonically decrease in size. While in the highest size bracket average flotation costs sum up to 5.01%, they are equal to 20.63%, i.e. roughly four times as high, for the companies in the lowest size bracket.

		N	Mean	Weighted Mean	Median
Gross offering proceeds m€	All	334	125.827		13.509
	Main Board	202	196.018		37.879
	GEM	132	18.413		7.057
Total flotation costs	All	334	14.62%	5.01%	12.71%
	Main Board	202	10.90%	4.69%	7.93%
	GEM	132	20.31%	11.35%	20.00%
Other expenses	All	334	11.58%	2.82%	9.96%
	Main Board	202	8.18%	2.56%	5.36%
	GEM	132	16.79%	8.09%	16.05%
Gross spread	All	334	3.03%	2.18%	2.50%
	Main Board	202	2.71%	2.13%	2.50%
	GEM	132	3.52%	3.26%	3.50%

Table 10: IPO flotation costs in percent of gross offering proceeds at Hong-Kong Stock Exchange over the period 01/01/1999 to 31/03/2007

²² Because of the high concentration in the size bracket up to 100 m€, we decided to use the same size brackets as for the Nasdaq-sample presented in Table 9.

		N	Mean	Weighted mean	Median
All	other expenses	334	11.58%	2.82%	9.96%
	gross spread	334	3.03%	2.18%	2.50%
	total costs	334	14.62%	5.01%	12.71%
0-20 m€	other expenses	187	17.43%	14.90%	16.25%
	gross spread	187	3.21%	2.84%	3.00%
	total costs	187	20.63%	17.74%	19.61%
20-50 m€	other expenses	50	6.09%	6.23%	5.49%
	gross spread	50	2.50%	2.46%	2.50%
	total costs	50	8.94%	8.69%	8.49%
50-100 m€	other expenses	29	4.12%	4.45%	3.83%
	gross spread	29	2.80%	2.30%	2.50%
	total costs	29	6.92%	6.75%	6.73%
100-250 m€	other expenses	45	2.98%	3.33%	2.86%
	gross spread	45	2.84%	2.28%	2.50%
	total costs	45	5.82%	5.61%	5.60%
Over 250 m€	other expenses	23	2.28%	1.84%	2.04%
	gross spread	23	2.72%	2.11%	2.50%
	total costs	23	5.01%	3.94%	4.84%

Table 11: IPO flotation costs in percent of gross offering proceeds at Hong-Kong Stock Exchange over the period 01/01/1999 to 31/03/2007 for different size brackets

3.1.1.7 Comparing flotation costs at different listing venues

Total flotation costs

In Figure 7 we compare median and mean total IPO flotation costs for different listing venues. In terms of the median, Euronext has clearly the lowest total flotation cost with 6.6%, while Nyse and Deutsche Börse are close to each other with 7.7% resp. 7.9%. Nasdaq and LSE seem to be more expensive with 9.0% resp. 9.9%, while Hong-Kong Stock Exchange is by far the most expensive listing venue among those considered here with a median flotation cost of 12.7%. It is interesting to see that the ranking among the listing venues remains the same, if the mean flotation costs are used instead of the median flotation cost, although the differences, especially among Euronext, Nyse and Deutsche Börse, become quite smaller.

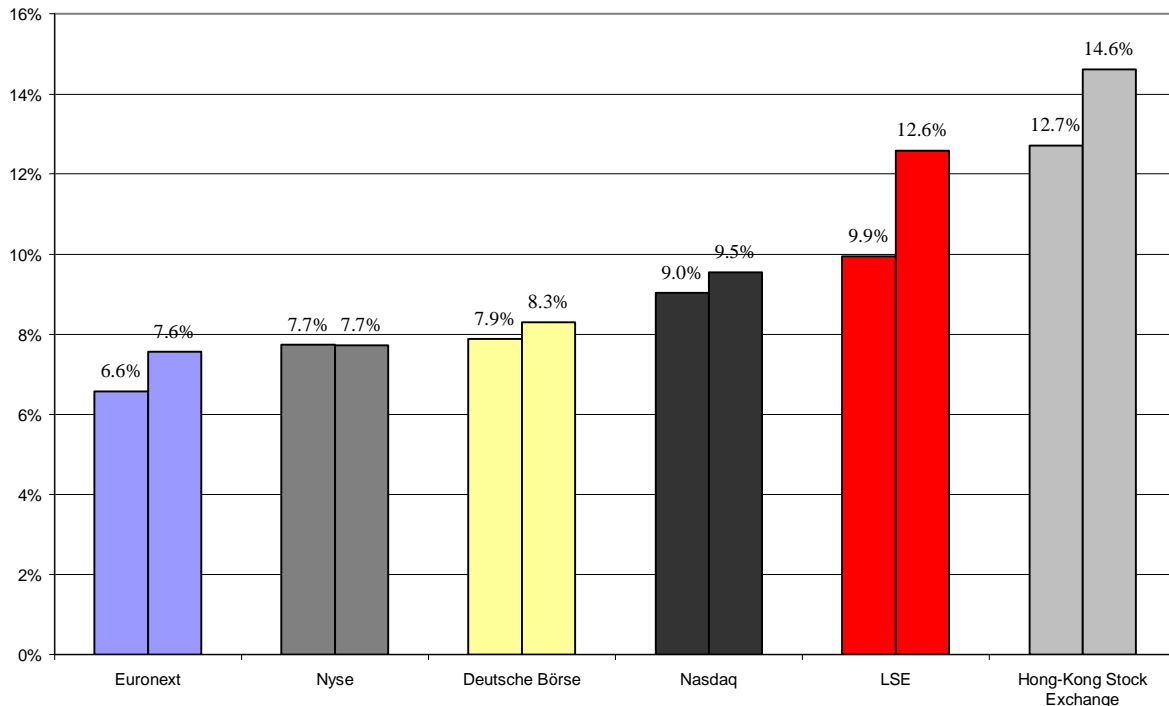


Figure 7: Median (first) and mean (second) total IPO flotation costs for different listing venues over the period 01/01/1999 to 31/03/2007

Of course, one has to be careful with such a comparison. As it is well known, flotation costs are determined by different factors, especially by the size of the firm.²³ Due to the fact that it was not possible to construct our sample by a perfect random sampling process, and taking into consideration the underlying differences in the firm size distribution on the capital markets under consideration here, it cannot be ruled out that there may be a selection bias. Indeed, a look at Table 1, p. 16, reveals that IPO proceeds are very much different among the different listing venues as well as the different market segments. For that reason we first look at flotation costs at different market segments, as with the exception of the US stock exchanges all others have segments targeted towards large and small cap firms. Second, we set up a regression model in order to control for all factors that do not depend on the listing venue.

Figure 8 gives total flotation costs for the large cap market segments of the exchange under consideration here. As neither Nyse nor Nasdaq have special market segments targeted towards large or small cap firms, we decided to artificially construct a large cap segment for these two exchanges. For that purpose we took the numbers in Table 8 and Table 9 recorded for issues larger than 100 m€ as being representative for large cap issues. Accordingly, issues up to 100 m€ were defined as being representative for small cap issues. Using the median flotation cost, one can see once again that the large cap segment at Euronext, called Eurolist, has the lowest initial flotation cost with 5.4%. The cost at the Frankfurt Prime/General Standard is 6.6%, which is clearly the second lowest figure. Then the other exchanges follow. In-

²³ For a detailed analysis of the determinants of IPO flotation costs cf., among other, Altinkiliç/Hansen (2003), Discounting and Underpricing in Seasoned Equity Offers, *Journal of Financial Economics* 69, pp. 285-323, and Kaserer/Kraft (2003), How issue size, risk, and complexity are influencing external financing costs - German IPOs analyzed from an Economies of Scale Perspective, *Journal of Business Finance and Accounting* 30, pp. 479-512.

terestingly, it turns out that according to median IPO flotation costs Nasdaq is the most expensive exchange.

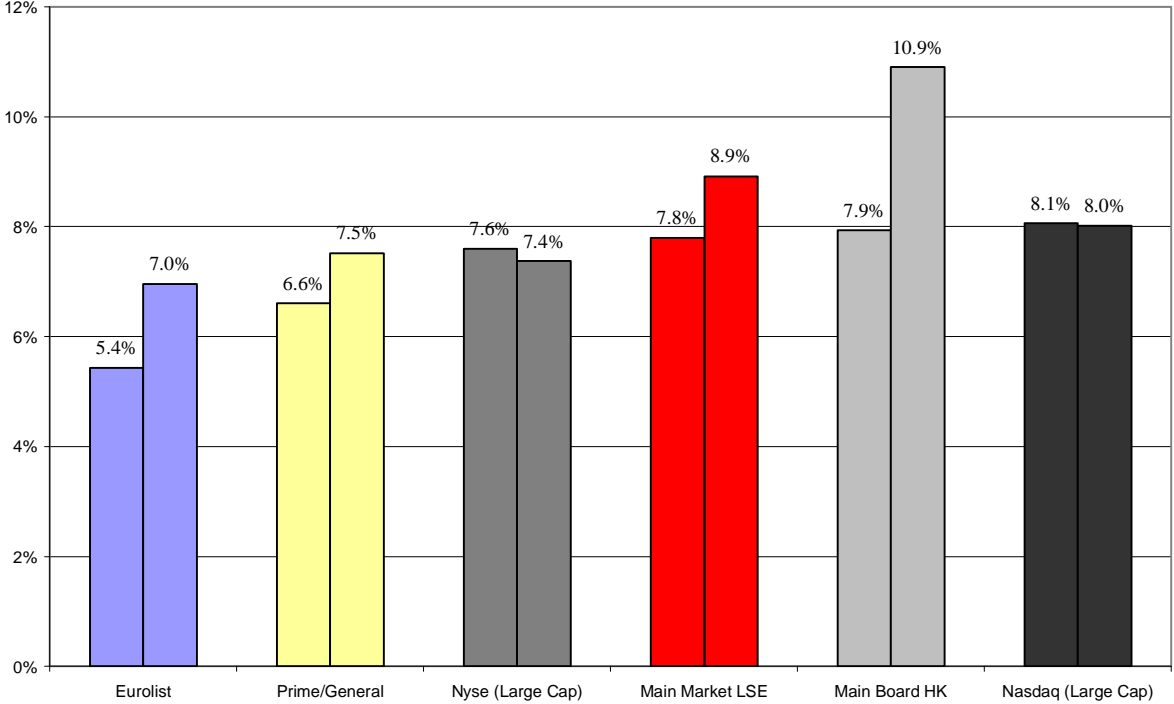


Figure 8: Median (first) and mean (second) total IPO flotation costs for large cap market segments at different listing venues over the period 01/01/1999 to 31/03/2007

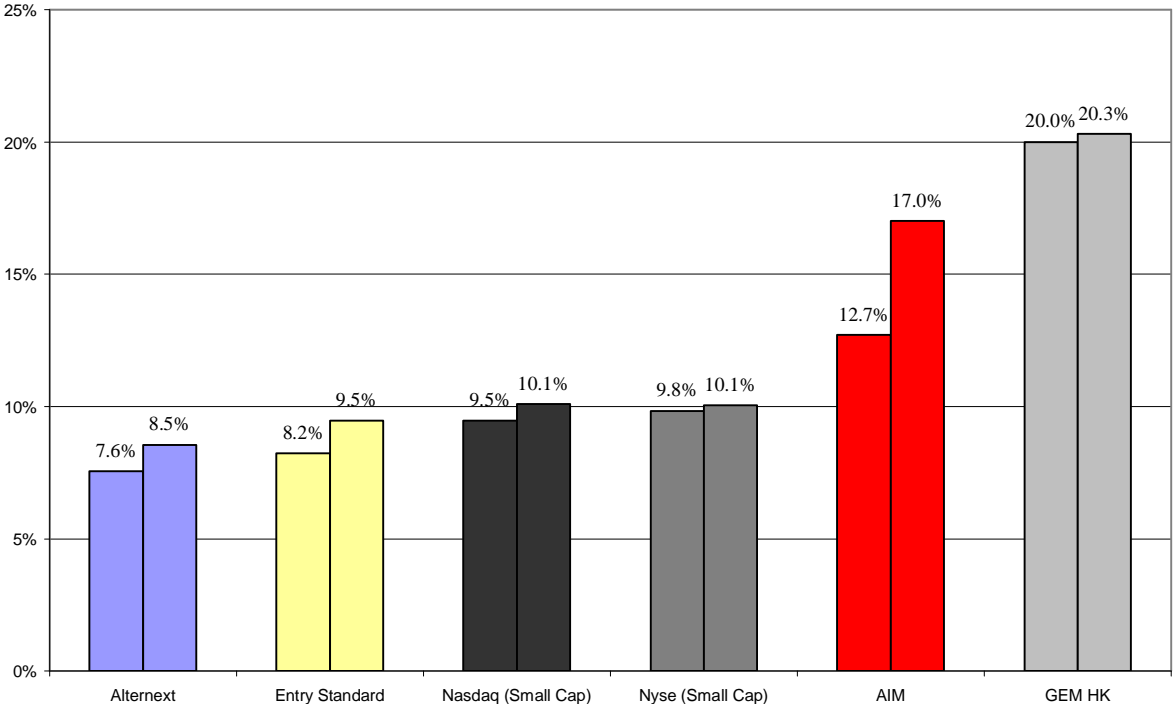


Figure 9: Median (first) and mean (second) total IPO flotation costs for small cap market segments at different listing venues over the period 01/01/1999 to 31/03/2007

Figure 9 gives total flotation costs for the small cap market segments. Using again the median flotation cost, one can see that the growth market segment at Euronext, called Alternext, has the lowest median flotation cost with 7.6%. The cost at the Deutsche Börse Entry Standard is 8.2%. Small issues at Nasdaq resp. Nyse incur a substantially higher median flotation cost of 9.5% resp. 9.8%. However, there is an even larger gap with respect to the AIM market as well as to the Growth Enterprise Market (GEM) at Hong-Kong Stock Exchange. Both markets are, irrespective of whether we focus on the median or mean flotation cost, extremely expensive. The companies on average have to pay between 12.7 and 20.3% of their flotation proceeds as underwriting fees and other issue expenses.

In order to exclude that our results are driven by a selection bias as well as to get an idea whether these difference in flotation costs are significant from a statistical point of view, we set up a linear regression model. We rely on academic literature showing that proceeds and the ratio of secondary shares offered to the public are the most important factors explaining flotation costs.²⁴ By using these variables we control for their on the flotation costs and, hence, we can test, whether flotation costs are significantly influenced by the listing venues. The results are given in Table 12. According to the adjusted R^2 the models are able to explain 30 to 37% of cross sectional variation in total flotation costs, which is not that bad. The base case in the first regression presented on the left-hand side of Table 12 is an IPO at Deutsche Börse. As we can see, total flotation costs are significantly higher at all other exchanges with the exception of Euronext. The difference is between 0.64 percentage points (Nasdaq) and 5.7 percentage points (Hong-Kong Stock Exchange). At the other side, IPOs at Euronext are significantly cheaper by 1.4 percentage points at Euronext.

Results are basically going in the same direction, if we further refine the model by using a dummy variable for all the market segments under consideration here. These results are reported on the right-hand side of Table 12. The base case is an issue at the Prime/General standard of Deutsche Börse. As one can see, Eurolist and Alternext, the two market segments at Euronext, have lower flotation costs, although the difference is not significant in a statistical sense. At the two London and Hong-Kong market segments costs are significantly higher (in the range of 1.7 to 11.5 percentage points). Similar is true for small cap issues at both New York exchanges. However, there is no significant difference with respect to the flotation costs at the Frankfurt Entry Standard as well as the Nasdaq and Nyse large cap segments.

As a final result it should be reported that for total flotation costs we do not find any trend, in the sense that costs may be decreasing or increasing over time.

In order to present the results of this OLS-estimation in a more illustrative way, we use the parameter estimation presented in Table 12 for estimating the absolute flotation cost for issues with different proceeds. First, this point estimation is done for the large cap segments. The results are presented in Table 13, where the ordering of the different exchanges is according to the size of flotation costs.²⁵ As one can see, the difference in absolute flotation costs can be substantial. While for a 250 m€ issue the cost at Eurolist resp. Prime/General Standard is 15 m€ resp. 17 m€, the cost is close to 20 m€ if the same issue is done at Nyse, Nasdaq or the LSE Main Market. At the Hong-Kong Main Board the cost might even be larger than 25 m€

²⁴ Cf. in this regard footnote 23 on p. 26.

²⁵ The reader should note that estimations are done based on the assumption that the ratio of secondary shares is equal zero.

	Coefficient	Std.Error	Prob.	Coefficient	Std.Error	Prob.
Constant	0.0763	0.0045	0.0000	0.0682	0.0071	0.0000
Secondary Shares	0.0129	0.0050	0.0108	0.0226	0.0049	0.0000
Proceeds	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1/Proceeds	0.1449	0.0070	0.0000	0.1223	0.0070	0.0000
Nasdaq	0.0175	0.0047	0.0002			
Nyse	0.0064	0.0053	0.2275			
LSE	0.0284	0.0055	0.0000			
Hong-Kong	0.0570	0.0053	0.0000			
Euronext	-0.0143	0.0068	0.0354			
Nasdaq (Large Cap)				0.0116	0.0076	0.1248
Nasdaq (Small Cap)				0.0296	0.0072	0.0000
Nyse (Large Cap)				0.0086	0.0075	0.2544
Nyse (Small Cap)				0.0309	0.0103	0.0028
AIM				0.0601	0.0085	0.0000
Main Market LSE				0.0175	0.0080	0.0296
Main Board HK				0.0339	0.0078	0.0000
GEM HK				0.1147	0.0083	0.0000
Eurolist				-0.0082	0.0093	0.3748
Alternext				-0.0056	0.0106	0.5957
Entry Standard				-0.0008	0.0135	0.9541
Neuer Markt				0.0131	0.0091	0.1467
Obs.	2,260			2,260		
Adj. R ²	0.30			0.37		

Notes: Dependent variable is the ratio of total flotation cost to offering proceeds. Secondary Shares gives the ratio of secondary shares offered to total shares offered. Proceeds are total offering proceeds in m€ Nasdaq, Nyse, LSE, Hong-Kong and Euronext are dummy variables set to 1, if the IPO has taken place at one of these exchanges. The base case is an IPO at Deutsche Börse. Nasdaq (Large Cap), Nasdaq (Small Cap), Nyse (Large Cap), Nyse (Small Cap), AIM, Main Market, Main Board, GEM, Eurolist, Alternext and Entry Standard are also dummy variables, which are set to one, if the IPO has taken place at one of these market segments. When using these dummy variables the base case is an IPO at the Prime/General market segment at Deutsche Börse.

Table 12: OLS-estimation results of total IPO flotation costs over the period 01/01/1999 to 31/03/2007

Almost the same ordering among the different stock exchanges applies for small cap market segments, as can be seen in Table 14. If one takes an issue of 50 m€ as representative, the cost at Alternext or Entry Standard is 4.8 m€ resp. 5.2 m€. For the Nasdaq and Nyse small cap segments it is close to 7.5 m€ while for AIM it reaches almost 10 m€. Again, the most expensive exchange is Hong-Kong, as the same issue realized at GEM would have a total cost of almost 14 m€.

Gross Proceeds	100 m€	250 m€	500 m€	1000 m€
Stock Exchange				
Eurolist	6.120	15.116	30.109	60.096
Prime/General Standard	6.943	17.174	34.225	68.328
Nyse (Large Cap)	7.799	19.315	38.508	76.893
Nasdaq (Large Cap)	8.103	20.075	40.027	79.932
Main Market LSE	8.692	21.548	42.973	85.823
Main Board HK	10.328	25.637	51.152	102.181

Table 13: Point estimation of total IPO flotation costs for different gross proceeds in the large cap segment (m€)

Gross Proceeds	10 m€	25 m€	50 m€	100 m€
Stock Exchange				
Alternext	0.748	3.252	4.817	6.382
Entry Standard	0.797	3.494	5.179	6.865
Nasdaq (Small Cap)	1.101	5.014	7.461	9.907
Nyse (Small Cap)	1.114	5.079	7.558	10.037
AIM	1.406	6.538	9.746	12.954
GEM HK	1.951	9.266	13.838	18.410

Table 14: Point estimation of total IPO flotation costs for different gross proceeds in the small cap segment (m€)

Other expenses

As far as the analysis of the underwriting and non-underwriting fees is concerned, we would like to point out that this analysis should be treated carefully, as we already reported that we do not have many new issues at the European exchanges, where this information was available. Hence, we report the results only by listing venue and not by different market segments. As one can see in Figure 10, new issues at the Nyse are burdened with the lowest non-underwriting fees equal to 1.2% of gross proceeds. Euronext, Nasdaq and Deutsche Börse are relatively close to each other, while issues at LSE and especially at Hong-Kong Stock Exchange suffer from very high non-underwriting fees. As far as the other expenses at Deutsche Börse and LSE are concerned this result is, by and large, in line with the results presented by Kaserer/Kraft (2003) as well as with the statement in the report of Oxera (2006), quoting that non-underwriting costs for an IPO in UK are in the range of. 2.5 to 6%.²⁶

As far as underwriting fees are concerned, the ranking among the exchanges is quite differently. Here, Hong-Kong Stock Exchange has the lowest fees equal to 2.5% for the median firm. LSE and Euronext with 3.3% and 3.6% are close to each other, while Deutsche Börse with 4.8% is perceptibly higher. On the top, however, we have Nyse and Nasdaq with 6.5% resp. 7.0%.

²⁶ Oxera (2006), The cost of capital: An international comparison, Oxford, p. 26.

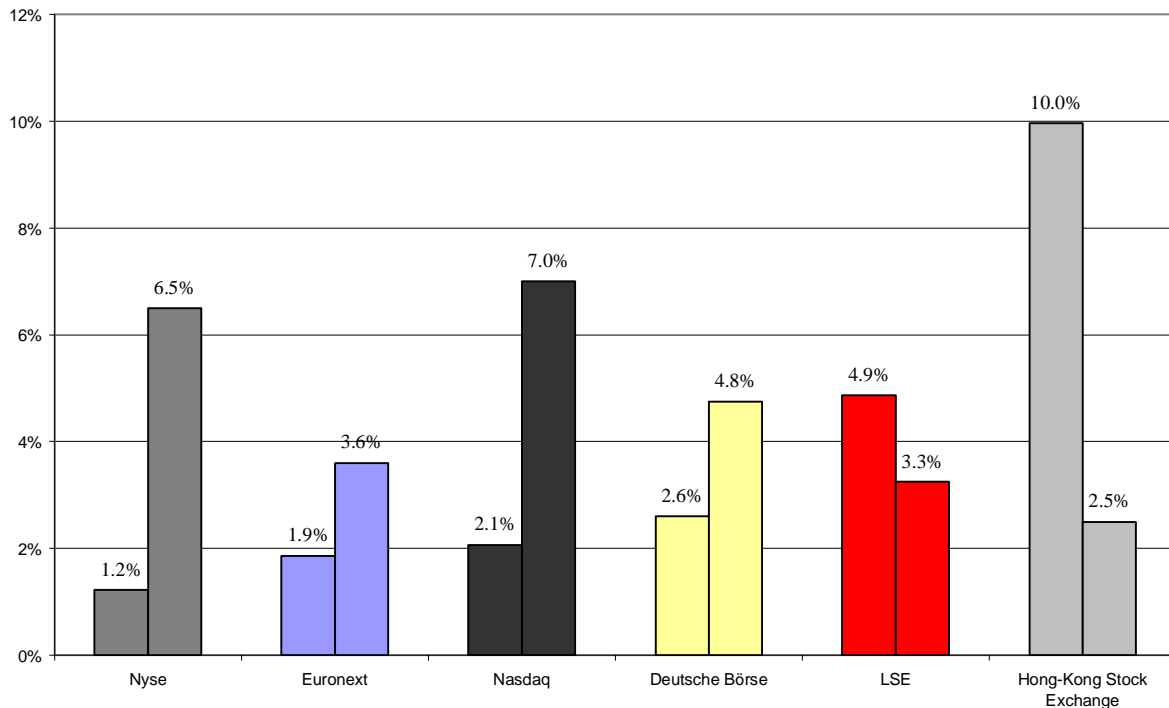


Figure 10: Median other expenses (first) and gross spread (second) by different listing venues over the period 01/01/1999 to 31/03/2007

As already pointed out, the comparison of a median or mean cost may be misleading because of the different size, or maybe also a different ratio of secondary to primary shares, at the different listing venues. Hence, we set up a linear regression model in order to control for these influences. Results are reported in Table 15. The model seems to work quite well, as we get an adjusted R^2 in the range of 53% to 58%. In the first regression, reported on the left-hand side of this table, we set an issue at Deutsche Börse as the base case. Contrary to the intuition reported in Figure 10 we find no statistically significant difference in the non-underwriting fees between Deutsche Börse, Nyse and Nasdaq. Actually, other expenses incurred at LSE and Hong-Kong Stock Exchange are significantly higher compared with Frankfurt, while issuer at Euronext profit from significantly lower non-underwriting fees.

The regression results reported on the right hand side of Table 15 analyse the non-underwriting fees by different market segments. Here, the base case is an issue at the Prime/General Standard at Deutsche Börse. The picture is pretty much the same, as issuer at both market segments of the Hong-Kong Stock Exchange and the LSE Main Market suffer from significantly higher other expenses. Similarly, the two market segments at Euronext have statistically significant lower non-underwriting fees. With respect to the market segments of the two New York exchanges there is no statistically significant difference.

	Coefficient	Std.Error	Prob.	Coefficient	Std.Error	Prob.
Constant	0.0211	0.0060	0.0005	0.0298	0.0092	0.0013
Proceeds	0.0000	0.0000	0.0000	0.0000	0.0000	0.0009
1/Proceeds	0.2854	0.0118	0.0000	0.2411	0.0116	0.0000
Nasdaq	0.0010	0.0061	0.8758			
Nyse	-0.0035	0.0064	0.5838			
LSE	0.0296	0.0082	0.0003			
Hong-Kong	0.0684	0.0064	0.0000			
Euronext	-0.0247	0.0088	0.0050			
Nasdaq (Large Cap)				-0.0169	0.0095	0.0741
Nasdaq (Small Cap)				-0.0036	0.0093	0.6987
Nyse (Large Cap)				-0.0146	0.0095	0.1226
Nyse (Small Cap)				-0.0014	0.0108	0.8987
AIM				0.0117	0.0278	0.6748
Main Market LSE				0.0213	0.0107	0.0470
Main Board HK				0.0392	0.0096	0.0000
GEM HK				0.1011	0.0099	0.0000
Eurolist				-0.0277	0.0116	0.0174
Alternext				-0.0321	0.0150	0.0322
Entry Standard				-0.0111	0.0117	0.3418
Obs.	1,874			1,874		
Adj. R ²	0.53			0.59		

Notes: Dependent variable is the ratio of non-underwriting fees to offering proceeds. Proceeds are total offering proceeds in m€ Nasdaq, Nyse, LSE, Hong-Kong and Euronext are dummy variables set to 1, if the IPO has taken place at one of these exchanges. The base case is an IPO at Deutsche Börse. Nasdaq (Large Cap), Nasdaq (Small Cap), Nyse (Large Cap), Nyse (Small Cap), AIM, Main Market, Main Board, GEM, Eurolist, Alternext and Entry Standard are also dummy variables, which are set to 1, if the IPO has taken place at one of these market segments. Because of the small number of observations for the Entry Standard, the observations related to Neuer Markt were subsumed under the Entry Standard segment. When using these dummy variables the base case is an IPO at the Prime/General market segment at Deutsche Börse.

Table 15: OLS-estimation results of other expenses over the period 01/01/1999 to 31/03/2007

Gross spread

In the next step we look at the gross spread. Results are reported in Table 16. In this case our linear regression model seems to work even better, as we get an adjusted R² in the range of 80% to 81%. In the first regression, reported on the left-hand side of this table, we set an issue at Deutsche Börse as the base case. Contrary to the intuition reported in Figure 10 we find no statistically significant difference in the underwriting fees between Deutsche Börse and Euronext. The other results of Figure 10 are corroborated, however. Issuer at Nyse and Nasdaq incur statistically significant higher gross spreads, while issuer at LSE and Hong-Kong Stock Exchange profit from statistically significant lower underwriting fees.

The regression results reported on the right-hand side of Table 16 analyse the non-underwriting fees by different market segments. Here, the base case is an issue at the Prime/General Standard at Deutsche Börse. Actually, the picture with respect to Nyse, Nasdaq, Hong-Kong Stock Exchange and Euronext is the same, while we do not find a statis-

tically significant difference with respect to AIM or LSE Main Market. However, with respect to Euronext it changes, as both market segments there seem to have lower underwriting fees than those that are prevalent at the Prime/General Standard at Deutsche Börse. As an additional insight it is interesting to see that at the Frankfurt Entry Standard underwriting fees are significantly higher than at the Prime/General Standard, when controlling for issue size.

	Coefficient	Std.Error	Prob.	Coefficient	Std.Error	Prob.
Constant	0.0440	0.0012	0.0000	0.0375	0.0020	0.0000
Proceeds	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1/Proceeds	0.0648	0.0024	0.0000	0.0628	0.0025	0.0000
Nasdaq	0.0244	0.0012	0.0000			
Nyse	0.0193	0.0013	0.0000			
LSE	-0.0075	0.0017	0.0000			
Hong-Kong	-0.0193	0.0013	0.0000			
Euronext	-0.0017	0.0018	0.3329			
Nasdaq (Large Cap)				0.0300	0.0020	0.0000
Nasdaq (Small Cap)				0.0313	0.0020	0.0000
Nyse (Large Cap)				0.0249	0.0020	0.0000
Nyse (Small Cap)				0.0313	0.0023	0.0000
AIM				0.0051	0.0060	0.3914
Main Market LSE				-0.0013	0.0023	0.5718
Main Board HK				-0.0131	0.0021	0.0000
GEM HK				-0.0118	0.0021	0.0000
Eurolist				0.0048	0.0025	0.0559
Alternext				0.0053	0.0032	0.1010
Entry Standard				0.0104	0.0025	0.0000
Obs.	1,874			1,874		
Adj. R ²	0.80			0.81		

Notes: Dependent variable is the ratio of underwriting fees to offering proceeds. Proceeds are total offering proceeds in m€ Nasdaq, Nyse, LSE, Hong-Kong and Euronext are dummy variables set to 1, if the IPO has taken place at one of these exchanges. The base case is an IPO at Deutsche Börse. Nasdaq (Large Cap), Nasdaq (Small Cap), Nyse (Large Cap), Nyse (Small Cap), AIM, Main Market, Main Board, GEM, Eurolist, Alternext and Entry Standard are also dummy variables, which are set to 1, if the IPO has taken place at one of these market segments. Because of the small number of observations for the Entry Standard, the observations related to Neuer Markt were subsumed under the Entry Standard segment. When using these dummy variables the base case is an IPO at the Prime/General market segment at Deutsche Börse.

Table 16: OLS-estimation results of gross spreads over the period 01/01/1999 to 31/03/2007

3.1.2 Admission fees

Although admission fees regularly are assumed to be negligible, a closer look reveals that the differences can be quite substantial, as it is revealed by Table 17. While Deutsche Börse AG has fixed admission fees of 5,500 Euros at the Prime/General Standard, admission fees at the large cap market segments of the other stock exchanges are related to the market capitalization of the company to be listed. For a market capitalization of 1 bn Euros, admission fees at LSE Main Market are above 200,000 Euros. The most expensive market segment for such an

issuer is Euronext. But also the fees at the LSE Main Market as well as both US exchanges are substantially higher than at Deutsche Börse.

As far as growth markets are concerned the picture is a little bit different, as the London AIM-market has a fixed fee of 4,535 Pound Sterling. This is quite higher than the fixed fee of 750 Euros charged by the Frankfurt Entry Standard. All the other exchanges have again market capitalization related fees, which are substantially above the fee at the Entry Standard. Assuming a market capitalization of 50 million Euros, Nyse is by far the most expensive stock exchange. But even when looking at core growth markets only, it turns out that there is a perceptible difference between the Entry Standard at the one side and Alternext and GEM at the other side.

Market Cap Stock Exchange	10 m€	50 m€	250 m€	500 m€	1000 m€
Deutsche Börse					
Prime / General			5,500		
Entry			750		
Euronext					
Eurolist	10,000	34,000	124,000	224,000	374,000
Alternext	7,500	31,500	121,500	221,500	371,500
Hong Kong					
Main Board	15,000		20,000	25,000	35,000
GEM	10,000			15,000	
LSE					
Main Market	16,614	49,991	133,271	179,447	221,590
AIM			6,712		
Nasdaq	71,429	89,286		107,143	
NYSE	107,143		112,500	178,571	

Notes: For the calculation we looked at the fee schedules for domestic issuers of ordinary shares (and no other share classes). For Nasdaq the fee schedule of the Nasdaq Global Market was used. Where necessary we assumed a share price of 10€ The following exchange rates were used: 1€=1.4US-\$=1/1.48£=10HK-\$.

Table 17: Admission fees by market capitalization

Source: Websites of Exchanges

3.1.3 Compliance costs (and returns)

There is no doubt that the compliance with the regulatory framework that is imposed on listed companies entails substantial costs. Interestingly, there is an ongoing discussion as to whether the adoption of the Sarbanes-Oxley Act (SOX) in 2002, leading to a significant change of corporate governance rules, financial disclosure and public accounting practices in the US, is challenging the international leadership of US equity markets. In fact, while IPO volume in the US used to be consistently higher than in Europe, this ranking changed since 2005. According to statistics presented by Thomson One Banker total IPO volume in Europe has been

larger than that in the US since 2005.²⁷ This feeds serious concerns that the regulatory framework in the US is causing costs to an extent that reduces the propensity of being a US-listed company significantly.²⁸ It is interesting to note in this regard that non-underwriting fees for IPOs in the US have significantly increased over the last years. In Table 18 gross spread, other expenses and total flotation costs at Nyse and Nasdaq are compared for the periods 1999-2003 to 2004-2007. Taking the median, it can be seen that gross spreads are unchanged, while the other expenses have increased 0.42 resp. 0.77 percentage points at Nyse resp. Nasdaq.²⁹

		N	Mean	Weighted mean	Median
1999-2003	gross spread	127	6.11%	4.68%	6.50%
	other expenses	127	1.28%	0.68%	0.97%
	total costs	127	7.39%	5.36%	7.57%
Nyse					
2004-2007	gross spread	215	6.18%	5.55%	6.50%
	other expenses	215	1.74%	1.21%	1.39%
	total costs	215	7.92%	6.76%	7.79%
<hr/>					
1999-2003	gross spread	706	6.92%	6.51%	7.00%
	other expenses	706	2.26%	1.53%	1.85%
	total costs	706	9.18%	8.03%	8.84%
Nasdaq					
2004-2007	gross spread	363	6.88%	6.55%	7.00%
	other expenses	363	3.36%	2.16%	2.62%
	total costs	363	10.24%	8.71%	9.60%

Table 18: Comparison of flotation costs at Nyse and Nasdaq

According to the results presented in Table 19 the increase in non-underwriting fees controlled for size and other factors is equal to 0.67 percentage points, which is very close to the numbers presented in Table 18. As it can be seen, this increase is statistically highly significant. For the gross spread, however, there has been a small, although significant decrease of 0.1 percentage points over the periods under consideration here. This is in line with the presumption that the Sarbanes-Oxley Act has also lead to an increase in flotation costs of US-related IPOs.

Now, apart from this specific issue in the context of this study we have to address the question whether there are any significant differences in the costs of complying with the different regulatory frameworks at different exchanges. Actually, when doing such a comparison it has to

²⁷ Cf. also Table 5, p. 20.

²⁸ In the press figures of 1.6 to 4.4 m US-\$ are reported as different estimates on the cost of the Sarbanes-Oxley Act. Cf. for instance Bialik (2005), How Much Is It Really Costing To Comply With Sarbanes-Oxley?, Wall Street Journal Online, June 16, 2005. Moreover, recently several European companies took the newly created legal opportunity to withdraw their listing at the Nyse.

²⁹ Although SOX was signed into law in the year 2002, some provisions became effective for listed companies with a delay of one or more years. For instance, the SEC final rule on management reports related to section 404 of SOX became effective in the year 2004. Hence, we defined the post-SOX period to start with the year 2004.

be emphasized that the set of regulations a company has to comply with is determined by both the jurisdiction of incorporation and the listing venue. By deciding on the country of incorporation, the company is subject to the corporate law and related rules applying to this country. By deciding on the primary listing venue, the company has to comply with all the financial market rules applying to this country as well as with additional rules set up by the stock exchanges.

Dependent variable:	Other expenses			Gross spread		
	Coefficient	Std.Error	Prob.	Coefficient	Std.Error	Prob.
Constant	0.0055	0.0016	0.0008	0.0657	0.0004	0.0000
Secondary Shares	-0.0030	0.0029	0.2942	-0.0021	0.0007	0.0055
Proceeds	0.0000	0.0000	0.6403	0.0000	0.0000	0.0000
1/Proceeds	1.2102	0.0521	0.0000	0.0565	0.0136	0.0000
2004_07_Dummy	0.0067	0.0013	0.0000	-0.0010	0.0003	0.0037
Nasdaq	-0.0025	0.0016	0.1161	0.0037	0.0004	0.0000
Obs.	1,405			1,405		
Adj. R ²	0.33			0.42		

Notes: Dependent variable is the ratio of non-underwriting fees or underwriting fees to offering proceeds. Proceeds are total offering proceeds in m€ Nasdaq is a dummy variables set to 1, if the IPO has taken place at this exchange. The base case is an IPO at Nyse. 2004_07_Dummy is a dummy variable set to 1, if the IPO has taken place in the year 2004 or later, and zero otherwise.

Table 19: Comparison of flotation costs for a pre- and post-SOX-period at Nyse and Nasdaq in an OLS estimation context

Now, although most companies choose the domestic stock exchange as their primary listing venue, it is nevertheless true that they have the opportunity to opt for a foreign stock exchange, if they expect to have an advantage by doing so. In terms of compliance costs, such an advantage would occur, if it were less expensive to comply with the particular set of legal rules that depend on the listing venue. Now, as far as the European market is concerned the opportunity for this kind of regulatory arbitrage has become rather small. At least, this is true as far as the companies apply for a listing at the regulated market. In that case the whole set of rules with respect to listing requirements, disclosure and other financial market issues are mainly determined by European financial market law.³⁰ As a consequence, differences in the rules applied by the stock exchanges are rather small, as far as the EU-regulated markets are concerned.³¹ At the exchange-regulated markets, however, listing rules and disclosure requirements are, to a larger extend, set by the stock exchange, although competitive forces seem to make these differences small in practice.

³⁰ As an example for an important step of harmonization the Regulation (EC) No 1606/2002 of the European Parliament and of the Council of July, 19, 2002 on the application of international accounting standards should be mentioned. Also, the Directive 2004/25/EC of the European Parliament and of the Council of April 21, 2004, on takeover bids, Official Journal L 142 , 30/04/2004 P. 0012 – 0023, is a pertinent example.

³¹ For a detailed comparison of the different market segments at Deutsche Börse and London Stock Exchange cf. Kaserer/Schiereck (2006), Deutsche Börse: Going Public and Being Public. The Impact of the Listing Decision on the Cost of Capital – An International Comparison, Frankfurt.

Now, it certainly should not be argued here that there are no important differences in the corporate governance rules applying to firms incorporated in one of the countries under consideration in this study. However, these differences are predominantly due to a different corporate law setting, even though in Europe differences are evened-out by the process of European legal harmonization. Moreover, difference may arise because of a different enforcement enacted in both states.

Apart from these considerations one might argue that at the end the question, whether compliance costs are different at different exchanges, can only be answered on the basis of empirical data. Of course, this would be an appealing approach. It is obvious that the measurement of these costs is very difficult. As a weak indication, however, one could use non-underwriting fees disclosed in prospectuses, as these fees, at least to some extent, may be caused by compliance efforts related to the listing of new or seasoned shares. It is interesting to note in this regard that according to the evidence presented in Table 15 issuers at LSE and Hong-Kong Stock Exchange have to bear significantly higher non-underwriting fees than at the other markets.

As a final remark it should be mentioned that even though the compliance with corporate governance standards causes a cost to the firms, there may be also an advantage in terms of a reduced cost of capital. This is why there must not necessarily be a race to the bottom. To the extent that such a race might occur regulation is necessary, at least as long as there is a social benefit from these corporate governance rules. From the perspective of the company, however, the presumed benefit of a higher corporate governance standard could only be fully internalized, if it moves both the listing as the state of incorporation into the presumably better jurisdiction.

3.2 Indirect costs: IPO Underpricing

3.2.1 Introduction

Numerous empirical studies³² have documented a strong trend of issuing companies to systematically offer their shares at a significant discount. Most existing explanations for this IPO discount, measured as the difference between the IPO offer price and the closing market price of the first trading day, focus on information asymmetries between the various parties involved in the IPO.³³ From an underwriter's perspective, IPO discounts serve as a mean to ensure e.g. full subscription of the offerings. Discounts, therefore, tend to be higher the riskier the issuing firm is in order to attract as many investors as possible. Also, underwriters by underpricing the issue avoid costly law suits caused by displeased investors or issuers.

For the investor underpricing presents a systematic opportunity to generate excess returns on his investments. Hence, investors should favour stock exchanges with high underpricings over those with comparably low underpricings. However, on the contrary, an empirically observed and theoretically justified strong positive correlation with the degree of underpricing and the riskiness of a firm suggests that those stock exchanges where high underpricings can be observed provide riskier investment opportunities. This, in turn, might lead investors to forego investments at those particular stock exchanges.

³² A good overview among differences in underpricing across different markets is provided by Ritter (2003), Differences in European and American IPO Markets, *European Financial Management* 9, pp. 421-434.

³³ See Ljungqvist/Wilhelm (2003), IPO Pricing in the Dot-com Bubble, *Journal of Finance* 58, pp. 723-752.

From the perspective of the issuing firm, IPO discounts are one source of indirect costs of going public. For example, for a company issuing 10 million new shares at a price of €10 an underpricing of 10% leads to indirect costs of €10m since the company could have issued the same shares at a price of €1. Contrariwise, there are at least two strong reasons why issuing firms might also be interested in underpricing their shares. First, issuing companies, just as underwriters, seek to ensure full subscription of their issues. Second, especially firms considering secondary equity offerings as a mean of subsequent financing in the future, have a high interest in successfully placing their shares and avoiding bad publicity and investors' resentment. Both can be achieved through an IPO discount, since a lower offering price increases the probability of full subscription and also the positive news coverage and the investors' interest in future equity offerings.

As Ritter (2003) documents, underpricing varies significantly across countries. Hence, the following analysis measures one source of indirect costs of going public across all six stock exchanges by comparing IPO discounts. To this end, the following analysis is organized as follows. The next section introduces the sample and describes our methodology used for comparing underpricing of Deutsche Börse with the other stock exchanges. Thereafter, results of our analysis are presented and discussed.

3.2.2 Data, methodology and descriptive statistics

The sample consists of all firms completing an initial public offering of common stock at one of the six analysed stock exchanges between January 2005 and December 2006. Since not all data was available directly from the stock exchanges and to further avoid a bias due to differences in IPO definitions across stock exchanges, we use Thomson Financial's SDC database and exclude unit offerings, closed-end funds and ADRs to derive our preliminary list of IPOs.³⁴ We restrict our final sample to fulfil the following criteria:

§ IPO offer price is available from Thomson Financial's database

§ Stock price and market index price information is available through Datastream

The resulting final sample consists of 989 IPOs. Table 20 provides an overview of all IPOs in our sample.³⁵ Although the number of IPOs differs significantly among the stock exchanges, each sample is sufficiently large to draw general conclusions and enable comparisons across stock exchanges. Also, the overall number of IPOs is larger in 2006 than in 2005.

In line with prior studies we apply two distinct measures of underpricing: raw underpricing and index-adjusted underpricing.

Raw underpricing is defined as follows:

$$[P_1 - P_0] / P_0,$$

where P_1 is the aftermarket price of an IPO at the end of the first trading day and P_0 is the IPO offer price. In addition we calculate the index-adjusted underpricing:

$$[P_1 - P_0] / P_0 - [I_1 - I_0] / I_0,$$

³⁴ For a similar procedure see e.g. Aggrawal/ Prabhala/ Puri (2002), Institutional Allocation in Initial Public Offerings: Empirical Evidence, *Journal of Finance* 57, pp. 1421-1442.

³⁵ Note that for the sake of conciseness we do not split up the Nyse and Nasdaq data into a large and small cap segment in this section.

where I_1 and I_0 are the IPO firm's corresponding market index returns. We apply the second measure to control for possible market movements at the first trading day which might exogenously influence the degree of underpricing.

	DBAG		Euronext		HKExchange		LSE		New York		Total
	Prime/General Standard	Entry Standard	Eurolist	Alternext	Main Board	GEM	Main Market	AIM	Nyse	Nasdaq	
05 Q1	3	0	3	0	5	2	2	43	11	16	85
05 Q2	0	0	8	6	10	0	10	55	9	19	117
05 Q3	2	0	2	2	5	3	3	39	16	35	107
05 Q4	7	4	10	5	19	3	10	55	5	25	143
06 Q1	2	3	3	9	6	0	7	55	8	23	116
06 Q2	9	10	7	10	6	0	6	63	10	28	149
06 Q3	7	7	2	8	9	0	3	34	3	17	90
06 Q4	12	12	18	12	14	0	13	41	16	44	182
Subtotal	42	36	53	52	74	8	54	385	78	207	989
Total	78		105		82		439		285		989

Table 20: New IPOs across time and stock exchanges (except for AIM where the number refers to new issues)

3.2.3 Analysis of underpricing

In Table 21 we compare underpricing across the different stock exchanges. Statistical significant differences in mean (t-test) and median (wilcoxon-test) at significance levels of 1%, 5% and 10% are denoted by ***, **, *. We compare the larger exchange segments Eurolist, MainBoard, Main Market, Nyse and Nasdaq to the Prime/General Standard and the smaller segments Alternext, GEM and AIM to the Entry Standard. We apply this distinction to account for the firm specific differences in stock exchange segments.³⁶ Results document two important facts: First, differences between raw underpricing and index-adjusted underpricing are negligible. Second, first day returns seem to vary significantly across stock exchanges, with Deutsche Börse being in the mid-range of underpricing. Findings suggest that companies floating at Deutsche Börse “left money on the table” in the sense that they could have chosen a higher IPO offer price. However, the money foregone through underpricing is significantly higher at MainBoard or AIM.

The presented (univariate) results do not account for possible size effects. However, as prior research has shown, the underpricing phenomenon is strongly correlated to the size of the IPO company. Hence, in a next step we apply a multiple regression model to account for a possible size-effect. Specifically, we include the following variables in our model:

³⁶ In chapter 4.2.1.2 firm-specific variables are compared across segments (i.e. the large segments and the small segments). Results strongly suggest a distinction between the two segments as firm characteristics differ systematically.

$$UP_j = \beta_0 size_j + \sum_{i=1}^{10} \beta_i Exchange_{ij} + e,$$

where the dependent variable UP stands for the index-adjusted underpricing³⁷ of firm j , the independent variable $size$ is the IPO proceed of firm j and the variable $Exchange$ is a dummy variable taking the value of one if firm j is from Exchange i and 0 if otherwise.

	DBAG		Euronext		HKEchange		LSE		New York	
	Prime/General Std.	Entry Std.	Euro- list	Alter- next	Main Board	GEM	Main Market	AIM	Nyse	Nas- daq
Raw underpricing (in %)										
No.	42	36	53	52	74	8	49	362	78	207
Mean	5.7	10.7	5.1	2.4 **	10.4	6.7	5.3	17.1	9.7	11.0 *
Median	2.2	0.3	3.6	0.0 *	6.3	2.6	2.9	9.4 ***	5.5	6.6
Min	-9.5	-6.0	-9.0	-24.5	-81.4	-12.0	-47.1	-56.5	-23.5	-38.9
Max	25.7	100.0	23.0	44.0	88.6	30.7	25.7	350.0	120.8	140.5
Index-adjusted underpricing (in %)										
No.	42	36	53	52	74	8	49	363	78	207
Mean	5.7	10.8	5.1	2.3 **	10.5	7.1	5.1	17.0	9.6	11.0
Median	2.7	0.7	3.4	0.2	5.6	2.4	2.5	9.2 ***	5.3	6.5
Min	-8.5	-5.8	-8.2	-24.8	-80.1	-11.7	-47.3	-56.7	-24.7	-38.5
Max	26.3	99.3	22.9	43.4	89.4	32.2	25.5	350.2	120.8	140.6

Table 21: Underpricing across exchange segments

Table 22 shows the results of the multiple regression model. The coefficient and the t-statistics are reported and ***, **, * denote statistical significance. The table shows that all exchange coefficients except for the Hong-Kong GEM exchange dummy are statistically significant and positive. This suggests that underpricing is significantly positive in all exchange segments except for GEM. Furthermore, the coefficient for $Size$ is significant and negative. This is in line with prior studies and indicates that the degree of underpricing is negatively correlated with firm size. In general, the regression model confirms the findings from our univariate analysis, i.e. that underpricing at Deutsche Börse is moderate compared to most other exchanges. As was discussed before there are arguments against and in favour of underpricing an IPO from the perspective of an issuer. Hence, Deutsche Börse seems to provide the optimal condition for aligning these different interests. However, overall explanatory power of the model is rather low suggesting that the variance in underpricing across firms can only to a very limited degree be explained by the different trading platform.

³⁷ Note that the alternative regression model with raw underpricing as the dependent variable was also calculated. Results were qualitatively the same and are thus not reported.

	Coefficient	t-statistic
Size	-0.021 ***	-3.28
Eurolist	0.156 ***	3.33
Alternext	0.077 **	2.01
Prime/General Standard	0.163 ***	3.25
Entry Standard	0.130 ***	2.97
Main Board	0.187 ***	4.89
GEM	0.116	1.31
Main Market	0.169 ***	3.34
AIM	0.224 ***	10.69
Nyse	0.214 ***	4.68
Nasdaq	0.199 ***	6.18
N	961	
Adj. R ²	4.6%	
F-prob	0.8%	

Table 22: Multiple regression model for underpricing across stock exchanges

4. The cost of being public

4.1 Direct costs

The direct cost of being public can be further split-up into two different components: (a) the costs incurred in the case the company decides to issue seasoned stocks and (b) continuous expenses caused by being a listed firm. These two cost components will be scrutinized in more detail in this section.

4.1.1 SEO flotation costs

According to former research median underwriting fees for a German SEO used to be equal to 1%, for UK equal to 1.75%, during the nineties. Table 23 gives a resume of some important findings for Germany, UK, Switzerland and France. It can be seen that underwriting fees in Europe tended to be rather low compared with the gross spread charged by US investment banks. As an additional finding of these former studies it turned out that UK SEOs had by far the highest non-underwriting fees.³⁸

In this study an international comparison will be done on a more recent database. For that purpose we have collected data on SEO flotation costs from the Thomson One Banker database as well as from the websites of the financial supervision authorities. Unfortunately, for the European exchanges it turned out that it was pretty difficult to collect detailed information on SEOs. One reason might be that according to the Directive 2001/34/EC³⁹ on the admission of securities to official stock exchange listing some exemptions from the obligation to publish a prospect are set up. These exemptions apply, among others, to SEOs under certain condi-

³⁸ For a more detailed analysis of the pertinent literature cf. Kaserer/Schiereck (2006), Deutsche Börse: Going Public and Being Public. The Impact of the Listing Decision on the Cost of Capital – An International Comparison, Frankfurt.

³⁹ Directive 2001/34/EC of the European Parliament and of the Council of 28 May 2001 on the admission of securities to official stock exchange listing and on information to be published on those securities, Official Journal L 184 , 06/07/2001 p. 1-66.

tions. For that reason we are able to gather relevant information for only a relatively small number of SEOs at Deutsche Börse, LSE and Euronext, while this number is substantially higher for Nyse, Nasdaq and Hong-Kong Stock exchange. More information is given in Table 24, where it can be seen that we have relevant information on 182 European SEOs and on 1,582 SEOs at Nyse, Nasdaq or Hong-Kong Stock Exchange.⁴⁰ Moreover, for Deutsche Börse and LSE we are only able to collect information on gross spreads, but not on other expenses.

		Germany	UK	Switzerland	France	US
Underwriting costs	Mean	1.32%	1.53%		1.70%	5.44%
	Median	1.00%	1.75%		1.50%	
Non-underwriting costs	Mean	0.29%	4.18%		0.37%	1.67%
	Median	0.27%	2.55%		0.23%	
Total flotation costs	Mean	1.61%	5.78%	4.53%	2.07%	7.11%
	Median	1.27%	4.28%	4.26%	1.73%	
Observations		120	583	74	219	1,593

Notes: German data is from Kaserer/Bühner (2002), *European Financial Management* 8, p. 326; period under consideration: 1993-1998. UK data is from Armitage (2000), *European Financial Management* 6, p. 62; period under consideration: 1985-1996. Swiss data is from Kaserer/Steiner (2004), *Financial Markets and Portfolio Management* 18, p. 29; period under consideration: 1996-2003. French data is from Gajewski/Ginglinger (2002), *European Finance Review* 6, p. 297; period under consideration: 1986-1996. US data is from Lee/Lochhead/Ritter (1996), *Journal of Financial Research* 19, p. 62; period under consideration: 1990-1994.

Table 23: Flotation costs for SEOs in different markets

The first interesting result emerging from Table 24 indicates that underwriting fees for SEOs have risen substantially since the nineties. This is especially true for Germany, and to a minor extent also for UK and France. In fact, while in Table 23 median underwriting fees were around 1% in Germany and 1.75% in the UK, this average now is 3% and 2%. Hence, especially in Germany a substantial increase has taken place. One, although limited, explanation for this development is related to the fact that issuing procedures today are different than they used to be up to the nineties. Since the end of the nineties in Germany as well as in the UK almost all SEOs were in the form of a rights offering. This is different today as about one third of the German offerings recorded in Table 24 were bookbuilding offerings; for the UK the ratio is still quite smaller. As it is known that bookbuilding offerings are more expensive because of the higher risk incurred by the investment bank, this could explain a part of the result reported in Table 24.⁴¹ Moreover, because of national rulings under the Directive 2001/34/EC on the admission of securities to official stock exchange listing, small offerings are much more likely to be exempted from the obligation to publish a prospectus. This may cause an additional bias.

A second interesting result emerging from Table 24 is the fact that SEOs are much more expensive at Nyse and Nasdaq than at Deutsche Börse or LSE. Euronext is somewhere in be-

⁴⁰ The reader should note that as far as SEOs at Deutsche Börse and LSE are concerned we have used the data already recorded for the preceding study of Kaserer/Schiereck (2006), *Deutsche Börse: Going Public and Being Public. The Impact of the Listing Decision on the Cost of Capital – An International Comparison*, Frankfurt.

⁴¹ Cf. Kaserer/Bühner (2002), *The Structure of External Financing Costs and the Economies of Scale View - New Evidence from Seasoned Equity Offerings in Germany*, *European Financial Management* 8, pp. 315-338, and additional references given there.

tween, although the gross spread there is also clearly higher than at the other two European exchanges. Contrary to the results that we have found for IPO flotation costs, Hong-Kong Stock Exchange offers SEOs at reasonable prices. A resume of these results can be found in Figure 11.

		Deutsche Börse	LSE	Euronext	Nyse	Nasdaq	Hong-Kong Stock Exchange
N		1,764	68	48	66	489	112
Gross offering proceeds m€	Mean	798.045	602.964	491.611	272.569	129.418	27.209
	Median	176.674	0.052	46.673	168.808	78.768	4.291
Total flotation costs	Mean	n.a.	n.a.	4.21%	4.35%	6.16%	3.87%
	Weighted mean	n.a.	n.a.	1.39%	3.52%	5.01%	2.99%
	Median	n.a.	n.a.	4.02%	4.64%	6.05%	2.86%
Other Expenses	Mean	n.a.	n.a.	1.20%	0.54%	1.01%	2.23%
	Weighted mean	n.a.	n.a.	0.20%	0.31%	0.65%	3.50%
	Median	n.a.	n.a.	0.81%	0.34%	0.60%	1.00%
Gross spread	Mean	3.02%	2.08%	3.50%	3.81%	5.16%	1.99%
	Weighted mean	2.04%	1.38%	2.51%	3.21%	4.36%	1.75%
	Median	3.00%	1.80%	3.83%	4.25%	5.26%	2.03%

Table 24: Comparison of SEO flotation costs by different listing venues over the period 01/01/1999 to 31/3/2007

	Coefficient	Std.Error	Prob.
Constant	0.0350	0.0024	0.0000
Proceeds	0.0000	0.0000	0.0000
1/Proceeds	0.0044	0.0023	0.0578
Nasdaq	0.0173	0.0025	0.0000
Nyse	0.0047	0.0025	0.0628
LSE	-0.0107	0.0036	0.0030
Hong-Kong	-0.0175	0.0034	0.0000
Euronext	0.0021	0.0052	0.6841
Obs.	1,684		
Adj. R ²	0.22		

Notes: Dependent variable is the ratio of underwriting fees to SEO offering proceeds. Proceeds are total offering proceeds in m€ Nasdaq, Nyse, LSE, Hong-Kong and Euronext are dummy variables set to 1, if the SEO has taken place at one of these exchanges. The base case is an SEO at Deutsche Börse.

Table 25: Comparison of SEO gross spreads in an OLS estimation context

Again, we would like to analyse whether the differences among the listing venues are statistically significant when controlling for issue size. As it was done in the context of IPO flotation cost analysis we use a linear regression model for that purpose. Results are reported in Table 25. As we do not have sufficient variables in order to control for other influences than size,

the adjusted R^2 is only 22%.⁴² However, as size is one of the most important variables determining the underwriting spread, this model might be appropriate for testing whether underwriting fees are influenced by the listing venue.

The results presented in Table 25 corroborate the findings given in Figure 11. It turns out that an issuer at Nasdaq has to bear a statistically significantly higher gross spread compared with the same issuer at Deutsche Börse. The difference with respect to Nyse is only weakly significant, while there is no statistically significant difference with respect to Euronext. Issuers at LSE and Hong-Kong Stock Exchange profit from a significantly lower underwriting fee.

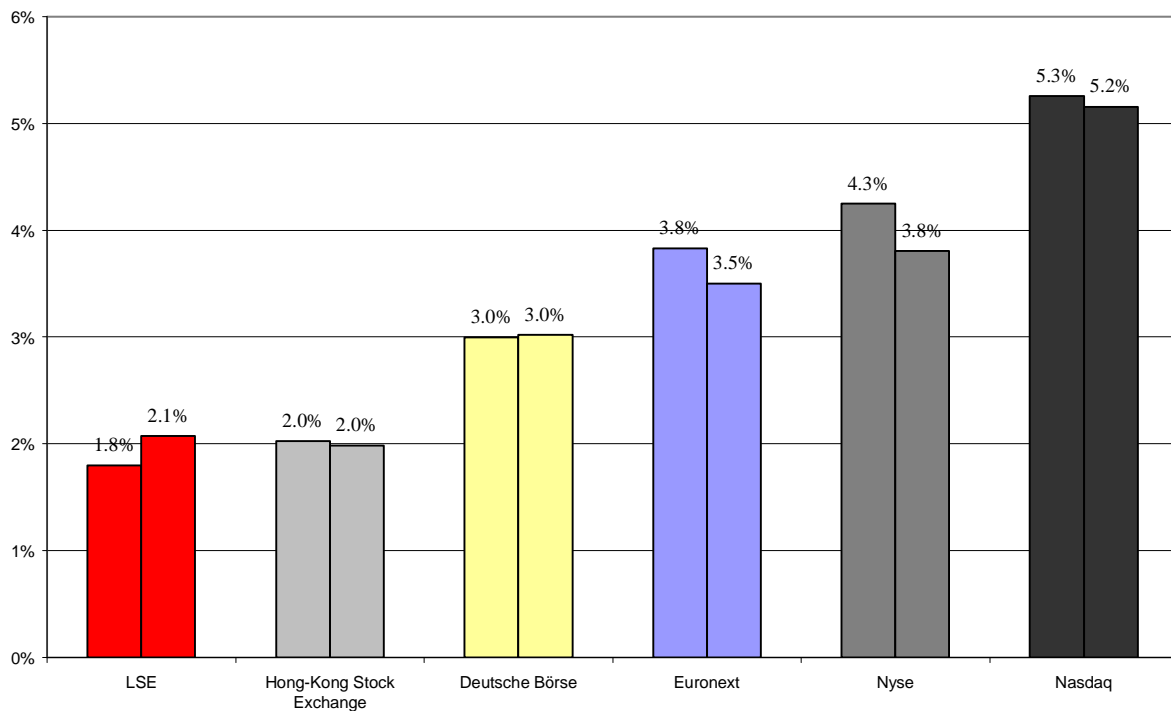


Figure 11: Median (first) and mean (second) SEO underwriting fees by different listing venues over the period 01/01/1999 to 31/03/2007

4.1.2 Listing fees

Like admission fees listing fees often are regarded as negligible, although one should be careful as these fees have to be paid on a yearly basis. Moreover, a closer look reveals that the differences among the different listing venues can be quite substantial. This is revealed by Table 26. While Deutsche Börse AG has fixed listing fees of 10,000 Euros at the Prime/General Standard, admission fees at the large cap market segments of the other stock exchanges are related to the market capitalization of the company to be listed. For a market capitalization of 1 bn Euros, listing fees at LSE Main Market are above 26,000 Euros. The most expensive market segment for such an issuer is Nyse or Nasdaq, where yearly listing fees are about 67,000 Euros.

⁴² A more sophisticated model is used in KasererSchiereck (2006), Deutsche Börse: Going Public and Being Public. The Impact of the Listing Decision on the Cost of Capital – An International Comparison, Frankfurt. For a more academic discussion of this issue cf. Kaserer/Bühner (2002), The Structure of External Financing Costs and the Economies of Scale View - New Evidence from Seasoned Equity Offerings in Germany, European Financial Management 8, pp. 315-338, and additional references given there.

As far as growth markets are concerned the picture is a little bit different, as the London AIM-market has a fixed fee of 4,535 Pound Sterling. This is higher than the fixed fee of 5,000 Euros charged by the Frankfurt Entry Standard. All the other exchanges have again market capitalization related fees, which are in most of the cases above the fee at the Entry Standard. Assuming a market capitalization of 50 million Euros, Nyse and Nasdaq are again by far the most expensive stock exchanges. But even when looking at core growth markets only, it turns out that Alternext is close the Entry Standard with a fee of 4,000 Euros, while GEM is twice as expensive as the Entry Standard with a fee of 10,000 Euros.

Market Cap	10 m€	50 m€	250 m€	500 m€	1000 m€
Stock Exchange					
Deutsche Börse					
Prime / General			10,000		
Entry			5,000		
Euronext					
Eurolist	3,000	4,000	12,000		16,000
Alternext	3,000	4,000	12,000		16,000
Hong Kong					
Main Board	14,500		17,200	22,400	35,600
GEM			10,000		
LSE					
Main Market	5,469		8,739	12,828	26,518
AIM			6,712		
Nasdaq	21,429	26,786		67,857	
NYSE		27,143		33,214	66,429

Notes: For the calculation we looked at the fee schedules for domestic issuers of ordinary shares (and no other share classes). For Nasdaq the fee schedule of the Nasdaq Global Market was used. Where necessary we assumed a share price of 10€ The following exchange rates were used: 1€=1.4US-\$=1/1.48£=10HK-\$.

Table 26: Listing fees by market capitalization

Source: Websites of Exchanges

4.1.3 Compliance costs

Basically, the same considerations apply here as for compliance costs in the context of IPOs. Therefore, the reader is referred to section 3.1.3.

4.2 Indirect costs

4.2.1 Trading costs

4.2.1.1 Introduction

Investors attempt to maximize the net returns of their portfolio trades and hence are willing to pay higher prices for shares, the lower the transaction costs of trading are. This influences the required gross returns of companies that raise equity via the stock market.⁴³ The higher the transaction costs the higher the required gross returns for companies raising equity. Domowitz/Steil (2001)⁴⁴ estimate that a 10% increase in transaction costs lead to a 1.4% to 1.7% increase in the post-tax cost of equity capital. Consistently with this estimate a number of empirical studies observe a positive relationship between returns and trading costs.⁴⁵ As defined by Harris (2003)⁴⁶ trading costs include all costs associated with securities trading. Specifically, trading costs consist of *explicit costs*, *implicit costs* and *missed trade opportunity costs*.

For explicit trading costs (brokerage commissions and fees) the study of Oxera (2006)⁴⁷ provides convincing evidence that direct trading costs differ across stock exchanges. The study shows that Deutsche Börse has rather low direct costs of trading compared to LSE and Nyse.

However, as Schiereck (1996)⁴⁸ documents, institutional investors base their choice of trading platform mostly on *implicit trading costs*. Consequently, the following analysis focuses on implicit trading costs only. Implicit trading costs are also known as costs of liquidity – a liquid stock market is a market offering only low implicit trading costs (low costs of liquidity or low liquidity premium). The more liquid a market the lower is the liquidity premium required by investors for buying a stock. A trading platform that is able to organize a liquid market in a stock reduces the cost of capital for a company raising equity and hence provides for more advantageous conditions for the company. The implicit trading costs are measured using the bid-ask spread (BAS). The BAS is the difference between the best binding buy opportunity and the best binding sell opportunity offered to investors at any given point of time. A trader who simultaneously buys and sells a share has to pay the BAS as so called round trip costs. Already Demsetz (1968)⁴⁹ argued that the bid-ask spread is the mark-up that is paid for predictable immediacy of exchange in organized markets.

To this end, the following analysis is organized as follows. The next section introduces the sample and describes our methodology used for comparing implicit trading costs of Deutsche Börse with other stock exchanges. Thereafter, results of our analysis are presented and discussed.

⁴³ See e.g. Amihud/Mendelson (1986), Asset Pricing and the Bid-Ask Spread, *Journal of Financial Economics* 17, pp. 223-249.

⁴⁴ See Domowitz/Steil (2001), Innovation in Equity Trading Systems: the Impact on Transactions Costs and Cost of Capital, in Nelson/Victor/Steil (eds.), *Technological Innovation and Economic Performance*, Princeton University Press.

⁴⁵ Consistent with the „liquidity hypothesis“ the following authors provide supporting empirical evidence: Amihud/Mendelson (1989), The Effects of Beta, Bid-Ask Spread, Residual Risk, and Size on Stock Returns, *Journal of Finance* 44, pp. 479-486, Eleswarapu (1997), Cost of Transacting and Expected Returns in the Nasdaq Market, *Journal of Finance* 52, pp. 2113-2127, Brennan/Subrahmanyam (1996), Market Microstructure and Asset Pricing, *Journal of Financial Economics* 41, pp. 441-464, Amihud/Mendelson/Lauterbach (1997), Market microstructure and securities values: Evidence from the Tel Aviv Stock Exchange, *Journal of Financial Economics* 45, pp. 365-390, Domowitz/Glen/Madhavan (2001), Liquidity, Volatility and Equity Trading Costs Across Countries and Over Time, *International Finance* 4, pp. 221-255.

⁴⁶ Harris (2003), *Trading & Exchanges: Market Microstructure for Practitioners*, Oxford, p. 421.

⁴⁷ Oxera (2006), *The cost of capital: An international comparison*, Oxford.

⁴⁸ Schiereck (1996), Börsenplatzentscheidungen institutioneller Investoren beim Handel deutscher Aktien, *Zeitschrift für Betriebswirtschaft*, 66, pp. 1057-1079.

⁴⁹ Demsetz (1968), The Cost of Transacting, *Quarterly Journal of Economics* 82, pp. 33-53.

4.2.1.2 Data and descriptive statistics

As in chapter 3.2 our sample consists of all firms completing an initial public offering of common stock at one of the six analysed stock exchanges between January 2005 and December 2006.

An interpretation of bid-ask spreads from different markets and diverging portfolios of stocks has to bear in mind that results sensitively depend on specific firm characteristics. Venkataraman (2001)⁵⁰ confirms these relationships and documents that the bid-ask spread differs systematically by firm-specific characteristics such as market size, stock trading volume, prices, and stock return volatility. Therefore, when comparing implicit trading costs across different market segments it is necessary to account for all these characteristics. In particular, we include the following five firm-specific variables into our trading cost analysis. Unless stated otherwise means across the first five trading days express the average value per item and market segment.

- § Market Value (*MV*) is used as the most common measure for company size. It is calculated as share price multiplied by the number of ordinary shares in issue. *MV* is displayed in millions of \$US.
- § Trading volume (*TVO*) is calculated as the number of shares traded (in thousands) multiplied with the unadjusted closing price per day.⁵¹ Relative trading volume (TVO / MV) is calculated as the ratio of trading volume by market value. This measure provides information about the relative level of trading volume of a specific company. Trading volume is a rough but remarkably well predicting indicator for market liquidity when standardized by market values.
- § Stock return volatility (*VOL*) is approximated as the standard deviation of daily returns over all observations included in the sample.
- § The zero-trade-ratio (*ZTR*) is estimated as the number of days without any trading over the total number of observation days included in the sample per stock. The lowest possible trading activity is no trades at all during a day. The more days without trading, the less trading activity takes place at the market segment. Thus, a liquidity measure estimating the probability of a no trading day is introduced.

Table 27 offers descriptive statistics for the firm-specific characteristics across the six stock exchanges.⁵² Means across the first five trading days express the average value per item and market segment. We also provide additional statistical information (minimum, maximum, medians). Statistical significant differences in mean (t-test) and median (wilcoxon-test) at significance levels of 1%, 5% and 10% are denoted by ***, **, *. Again, as in 3.2 we compare the larger exchange segments Eurolist, MainBoard, Main Market, Nyse and Nasdaq with the Prime/General Standard and the smaller segments Alternext, GEM and AIM to the Entry Standard. As in the analysis of underpricing, we apply this distinction to account for the firm specific differences in stock exchange segments which are in the following illustrated.

⁵⁰ Venkataraman (2001), Automated versus Floor Trading: An Analysis of Execution Costs on the Paris and New York Exchanges, *Journal of Finance* 56, pp. 1445-1485.

⁵¹ As Datastream does not provide sufficient data for trading volumes of German IPOs at the screen-based trading platform Xetra, the daily numbers of traded shares for Xetra and Frankfurt floor-based trading platform are provided by Deutsche Börse AG, separately.

⁵² Note that for the sake of conciseness we do not split up the Nyse and Nasdaq data into a large and small cap segment in this section.

	DBAG		Euronext		HKEchange		LSE		New York		Total
	Prime/General Std.	Entry Std.	Euro- list	Alter- next	Main Board	GEM	Main Market	AIM	Nyse	Nasdaq	
MV											
No.	42	36	53	52	74	8	53	383	78	207	986
Mean	793	75	1,684	48	548	30	1,347	92	1,264	368 ***	
Median	305	38	247	38	191 ***	22 *	494 *	45	799 ***	266 *	
Minimum	61	9	5	12	26	7	43	1	185	0	
Maximum	6,042	1,034	30,161	164	8,029	109	10,823	1,546	11,450	3,492	
TVO											
No.	42	36	53	49	74	8	48	378	28	88	804
Mean	41,845	5,301	31,215	537 *	20,499 **	469	63,282	1,232 ***	96,537 **	17,874 ***	
Median	11,608	1,554	5,317 **	102 ***	7,054 **	168 ***	15,903	185 ***	42,117 ***	9,570	
Minimum	163	39	0	2	84	6	104	0	6,329	52	
Maximum	352,709	119,295	468,066	5,769	180,228	2,459	408,520	47,454	746,031	113,819	
TVO/MV											
No.	42	36	52	49	74	8	48	379	28	87	803
Mean	5.55%	5.27%	1.97% ***	1.21% ***	3.92% **	1.69% *	3.85% *	1.12% ***	5.07%	4.77%	
Median	3.83%	3.24%	1.23% ***	0.32% ***	3.13%	0.78% **	2.68%	0.53% ***	4.42%	3.39%	
Minimum	0.10%	0.12%	0.00%	0.00%	0.23%	0.02%	0.05%	0.00%	1.42%	0.23%	
Maximum	22.57%	22.94%	18.44%	10.48%	12.82%	7.73%	12.61%	8.94%	16.60%	41.72%	

Table 27: Security characteristics of IPOs (respectively new issues at AIM)

	DBAG		Euronext		HKEchange		LSE		New York		Total
	Prime/General Std.	Entry Std.	Euro- list	Alter- next	Main Board	GEM	Main Mar- ket	AIM	Nyse	Nasdaq	
VOL											
No.	42	36	53	52	74	8	54	385	78	207	989
Mean	2.79%	3.81%	1.88% ***	2.77% *	3.08%	4.00%	1.98% ***	3.09%	2.13% ***	3.48%	
Median	2.45%	2.77%	1.83% ***	2.62%	2.94% ***	3.41%	1.85% ***	2.43% *	2.05% ***	2.92% ***	
Minimum	0.58%	1.01%	0.52%	1.28%	1.26%	2.11%	0.31%	0.00%	0.88%	0.72%	
Maximum	9.55%	21.90%	3.90%	6.58%	6.44%	6.16%	7.70%	82.57%	4.21%	41.94%	
ZTR											
No.	42	36	53	52	74	8	53	384	78	207	987
Mean	0.05%	1.39%	4.62% ***	7.01% ***	6.80% ***	33.42% ***	9.15% ***	39.89% ***	3.46% *	2.22%	
Median	0.00%	0.00%	3.20% ***	6.36% ***	7.37% ***	40.10% ***	5.36% ***	37.68% ***	3.95% ***	4.17% ***	
Minimum	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
Maximum	1.05%	27.45%	53.22%	52.24%	54.59%	95.36%	74.75%	96.67%	55.99%	93.91%	

Table 27 (cont'd): Security characteristics of IPOs (respectively new issues at AIM)

Note: Statistical significant differences in mean (t-test) and median (wilcoxon-test) at significance levels of 1%, 5% and 10% are denoted by ***, **, *.

Concerning market value there are significant differences across exchanges. Since means are highly distorted by some outliers (e.g. Gaz de France highly influences the high mean for Eurolist) it seems justifiable to compare median market values. As shown in Table 27 market value differs significantly across segments. Median values are systematically lower for the smaller segments. For the larger stock segments IPOs at NYSE (799m US\$) and LSE's Main Market (494m US\$) are the largest and significantly larger than IPOs at Prime/General Standard (305m US\$). However, comparing to Hong-Kong's Main Board (191m US\$) and to Nasdaq (266 US\$), IPOs at Prime/General Standard are significantly larger. IPOs at Eurolist (247m US\$) are not statistically different from those at Prime/General Standard. Regarding the smaller segments IPOs at Entry Standard (38m US\$) are larger or about the same size as at Alternext (38m US\$), GEM (22m US\$) and AIM (45m US\$) since only the difference to GEM is statistically significant.

Since trading volume is a rough but remarkably well predicting indicator for market liquidity when standardized by market values, we compare TVO/MV means across stock exchanges and segments. As Table 27 shows, Deutsche Börse IPOs have the highest TVO/MV ratios compared to all other exchanges. This provides evidence that firms going public at Deutsche Börse are more liquid than those floating at other trading platforms. Since liquidity and implicit trading costs are thought to be highly correlated, implicit trading costs at Deutsche Börse can be assumed to be lower. Differences are statistically significant for all exchanges except for Nyse and Nasdaq.

Copeland/Galai (1983)⁵³ present evidence that the bid-ask spread increases with greater price volatility. Comparing volatility (VOL) across stock exchanges shows that volatility of firms being listed in the Prime/General Standard (2.79%) is significantly larger than volatility of firms in the other peer exchanges. With the exception of Hong-Kong's Main Board and Nasdaq, all differences are significantly smaller. As regards the Entry Standard (3.81%) volatility levels are roughly the same for all peer segments since only Alternext shows significantly lower volatility levels.

The average ZTR at the Prime/General Standard (0.05%) is lower than for all its peers. Differences are statistically significant for all exchanges except for Nasdaq. These findings are very similar to the TVO/MV findings. As regards the Entry Standard (1.39%), the average ZTR is also lower than for all its peers. Especially GEM (33.42%) and AIM (39.89%) have very large average ZTRs and can be regarded as rather illiquid stock exchanges compared to the Entry Standard.

Summarizing these findings one can conclude that there are significant differences across stock exchanges with respect to firm-specific measures. First, we show that there are systematic differences between the small and the large segments with respect to all five firm characteristics. Second, we reveal ambiguous results. While two liquidity measure TVO/MV and ZTR suggest low implicit trading costs for Deutsche Börse, two measures (MV and VOL) also priorly shown to affect bid-ask spreads indicate the contrary. Altogether, results strongly suggest to take all five variables into account when analysing bid-ask spreads.

⁵³ Copeland/Galai (1983), Information Effects on the Bid-Ask-Spread, Journal of Finance 38, pp. 1457-1469.

4.2.1.3 Analysis of bid-ask spreads

We begin our analysis of implicit trading costs (i.e. bid-ask spreads) with a comparison across market segments on a stand alone basis. This provides some understanding of the total level of bid-ask spread. In a second step a multivariate regression will be conducted to control for potential combined effects by the firm characteristics discussed above. Implicit trading costs are approximated using the relative closing spread, which is provided by Datastream on a daily basis and calculated as follows:

$$Rspread = (C_a - C_b) / [(C_a + C_b) / 2]$$

where C_a is the closing ask price and C_b is the closing bid price. The relative spread is the favorable measure because it accounts for differences in price levels across securities.

	DBAG		Euronext		HKEchange		LSE		New York	
	Prime/ General Std.	Entry Std.	Euro- list	Alter- next	Main Board	GEM	Main Market	AIM	Nyse	Nas- daq
Rspread (in %)										
No.	42	32	53	49	74	8	48	383	28	88
Mean	0.62	2.23	0.71	4.52	1.04 ***	4.15 *	2.00 ***	7.22 ***	0.43 ***	0.74
Median	0.55	1.21	0.55	0.69 *	0.89 ***	3.41 **	1.70 ***	5.21 ***	0.41 *	0.63
Min	0.17	0.14	0.09	0.00	0.10	0.61	0.37	0.00	0.15	0.20
Max	1.37	10.91	3.26	80.72	3.39	9.21	5.50	66.67	0.82	2.41

Table 28: Relative bid-ask spread across stock exchanges

Table 28 shows that the relative spread for Prime/General Standard (0.62%) is statistically significantly smaller than at Hong-Kong's Main Board (1.04%) and LSE's Main Market (2.00%). Compared to Eurolist (0.71%) and Nasdaq (0.74%) the *Rspread* is also smaller, however, the differences in means are not significant. Only Nyse (0.43%) provides slightly lower relative spreads on average. The picture is very similar turning to the smaller exchange segments. The relative bid-ask spread for Entry Standard (2.23%) is statistically significantly smaller than at GEM (4.15%), Alternext (4.52%) and AIM (7.22%).

Findings on a stand alone basis suggest that implicit trading costs at Deutsche Börse are remarkably low compared to most of its peer exchanges. However, as discussed above the degree of implicit trading costs might be highly influenced by certain firm-specifics rather than stock exchanges. Hence, in a next step we measure relative bid-asks spreads and control for those firm-specifics. The model we use looks as follows:

$$Rspread_j = \delta_1 \log(MV) + \delta_2 \log(TVO) + \delta_3 TVO/MV + \delta_4 ZTR + \delta_5 VOL + \sum_{i=1}^{10} \beta_i Exchange_{ij} + e,$$

where the dependent variable *Rspread* stands for the relative bid-ask spread of firm *j*, the independent variable *MV*, *TVO*, *TVO/MV*, *ZTR* and *VOL* are the variables as described in 4.2.1.2 and the variable *Exchange* is a dummy variable taking the value of one if firm *j* is from Exchange *i* and 0 if otherwise. The structure of this model and the choice of variables for the regression analysis follow the regression framework applied by Venkataraman (2001). The specialty of this framework features no intercept but a different dummy variable for each market. This method allows an intuitive interpretation of the market variables. The coefficient measures the estimated implicit trading costs of executing a trade on each trading platform for an average firm from the entire sample. We apply a ridge regression instead of using the standard OLS method to avoid model problems with possible linear relationships among variables.⁵⁴

	Model 1			Model 2			Model 3		
	Coefficient		<i>t-value</i>	Coefficient		<i>t-value</i>	Coefficient		<i>t-value</i>
log(MV)	-0.008	***	-4.18	-0.008	***	-3.78	-0.008	***	-5.75
log(TVO)	0.001		0.45	-0.001		-1.05			
TVO/MV									
ZTR	0.065	***	6.34				0.063	***	6.36
VOL	0.050	*	1.64	0.047		1.50			
Eurolist	0.047	***	4.28	0.062	***	5.74	0.049	***	4.52
Alternext	0.063	***	7.02	0.076	***	8.53	0.065	***	7.29
Prime/General Std.	0.044	***	3.86	0.061	***	5.30	0.047	***	4.27
Entry Standard	0.039	***	3.56	0.055	***	5.11	0.042	***	4.13
Main Board	0.040	***	3.99	0.060	***	6.18	0.043	***	4.57
GEM	0.028		1.61	0.056	***	3.24	0.031	*	1.78
Main Market	0.059	***	5.00	0.079	***	6.87	0.061	***	5.36
AIM	0.073	***	9.36	0.106	***	18.03	0.076	***	10.12
Nyse	0.050	***	3.67	0.068	***	5.04	0.052	***	3.97
Nasdaq	0.043	***	4.34	0.060	***	6.16	0.047	***	4.97
N	797			797			797		
Adj. R ²	31.8%			29.5%			31.5%		
F-prob	0.0%			0.0%			0.0%		

Table 29: Multiple regression model for relative bid-ask spread

Table 29 reports regression results with *Rspread* as dependent variable. Coefficient and their respective t-statistics are reported and ***, **, * denote statistical significance at the 1%, 5%, and 10% level. The table shows three different models to further underline that results are not driven by collinearity. Results are fairly similar for all three models. As regards the firm-specific coefficients, two of the five coefficients are statistically significant. The coefficient for market value (*MV*) is significant and negative throughout each model indicating that larger firms experience lower relative bid-ask spreads. Furthermore, the coefficient of *ZTR* is positive and significant. In line with prior findings, this suggests that firms with high zero-trade-ratios experience higher implicit trading costs.

⁵⁴ Birkes, D., D. Yadolah (1993), *Alternative Methods of Regression*, John Wiley & Sons, Inc. (New York: New York).

As regards the exchange dummies all coefficients are positive and statistically significant except for GEM in Model 1. The positive coefficients are intuitive as they document that positive relative bid-ask spreads can be observed across all stock exchanges. Comparing the size of coefficients reveals that after controlling for differences in market value, trading volume and volatility, the Entry Segment exhibits the lowest implicit trading costs except for GEM. However, since the sample size for GEM is rather small, results cannot be assumed to be representative. The implicit trading costs of the Prime Standard and General Standard are also fairly low compared to its competitors from UK and USA. Next to Entry Standard, only Hong-Kong's Main Board and GEM appear to have lower trading costs once controlling for other variables.

The findings from a univariate analysis of *Rspread* could only partially be confirmed. While Deutsche Börse was confirmed to have very low implicit trading costs when controlling for several other factors, relative bid-ask spreads at Nyse emerge to be comparably high once account for other factors such as size and liquidity.

4.2.1.4 Lessons learnt

This chapter presented empirical evidence on implicit transaction costs across different stock exchanges. Transaction costs form the difference between net stock returns and gross stock returns. As investors focus on maximizing their net stock returns higher transaction costs induce higher expected gross returns and therefore higher costs of capital for exchange listed firms. Summarizing our results, we have clear evidence in favour of lower costs of capital induced by transaction costs at Deutsche Börse:

- § Explicit transaction costs at Deutsche Börse are rather low compared to LSE or Nyse. However, it is ultimately the extent of implicit trading costs which investors base their decisions on.
- § Firm characteristics revealed ambiguous results. While relative trading volumes and zero-trade ratios suggest low implicit trading costs at Deutsche Börse, market value and stock price volatility suggest the contrary.
- § Implicit trading costs (relative bid-ask spreads) are documented lowest for Entry Standard when controlling for firm characteristics. Also, the Prime/General Standard has comparably low spreads. Only the Hong-Kong Stock Exchange is documented to have lower spreads than the Prime/General Standard. Interestingly, the LSE and the two US exchanges (Nyse and Nasdaq) have higher spreads than Deutsche Börse once controlling for firm characteristics.

5. Comparative results

In this study we have presented a detailed comparison of the six global stock exchanges. The comparison was done along the dimensions of different types of direct and indirect costs associated with going public and being a listed firm. Evidently, the profile of the exchanges under consideration here is quite different. Hence, with respect to some dimensions one exchange offers advantageous terms, while with respect to others it does not. An issuer evidently, at the end of the day must decide which exchange shall be chosen as the primary listing venue. Therefore, we offer a comparison between these exchanges on the basis of a scoring model, which allows him to get a quick idea about the strong and weak points of any list-

ing venue. The results are presented in Table 30 and Table 31. We have chosen four variables related to the indirect cost of being public, and four variables related to the direct cost of going and being public. Evidently, there could be a lengthy discussion why we haven chosen exactly this set of variables and not any other. Although there is no straightforward way how to define which set of variables should be chosen, we think that we capture the most important topics for any firm considering going public.⁵⁵ For a short description how the scores have been assigned the reader is referred to the notes Table 30 and Table 31. The overall score, finally, is just the average score value assigned for any single criteria.

	Prime/General Standard	Main Board HK	Nyse (Large Cap)	Eurolist	Main Market LSE	Nasdaq (Large Cap)
Rspread	2	3	1	3	5	3
TVO/MV	2	3	3	5	3	3
VOL	3	3	3	3	3	4
ZTR	1	5	3	3	5	2
IPO - TFC	3	3	3	2	3	3
SEO - GS	3	2	3	3	2	5
Admission Fees	1	1	4	5	5	3
Listing Fees	1	3	4	1	1	5
Overall Score	2.0	2.9	3.0	3.1	3.4	3.5

Notes: Rspread is the mean relative spread, TVO is the mean trading volume, MV is the mean market value, VOL is the mean stock return volatility, ZTR is the mean zero-trade-ratio, IPO-TFC is the mean IPO total flotation costs, SEO-GS is the mean SEO gross spread, admission fees are the fees paid for listing the stocks the first time, listing fees are the yearly fees for having the stock listed. For calculating the admission and listing fees at the large segments we have assumed a market cap of 500 m€, at the small segments a market cap of 50 m€ SEO gross spreads have been calculated only by listing venue, not by market segment. In the case where we didn't split up the Nyse and Nasdaq analysis into a large and small cap segment, we took the same values for both segments. Scores are based on relative deviations from the mean value for each category (1=very good, ..., 5=very bad). 5 was assigned for a negative deviation from sample mean of more than 50%, 4 for a negative deviation between 26 and 50%, 3 for an absolute deviation of 25%, 2 for a positive deviation between 26 and 50%, and 1 for a positive deviation of more than 50%.

Table 30: Results of the scoring model by large cap market segments

⁵⁵ More specifically, one may argue that by taking into account listing as well as admission fees as two separate items, this type of cost is overweighted. However, even if these two items would get only half of the weight of all the other items, the rankings among the exchanges would remain almost the same.

Small Cap Segments						
	Entry Standard	Nyse (Small Cap)	Alternext	Nasdaq (Small Cap)	AIM	GEM HK
Rspread	2	1	4	1	5	4
TVO/MV	1	1	5	1	5	4
VOL	3	2	3	3	3	3
ZTR	1	1	1	1	5	5
IPO - TFC	3	3	2	3	4	5
SEO - GS	3	3	3	5	2	3
Admission Fees	1	5	3	5	1	1
Listing Fees	1	5	1	5	2	3
Overall Score	1.9	2.6	2.8	3.0	3.4	3.5

Notes: Rspread is the mean relative spread, TVO is the mean trading volume, MV is the mean market value, VOL is the mean stock return volatility, ZTR is the mean zero-trade-ratio, IPO-TFC is the mean IPO total flotation costs, SEO-GS is the mean SEO gross spread, admission fees are the fees paid for listing the stocks the first time, listing fees are the yearly fees for having the stock listed. For calculating the admission and listing fees at the large segments we have assumed a market cap of 500 m€ at the small segments a market cap of 50 m€ SEO gross spreads have been calculated only by listing venue, not by market segment. In the case where we didn't split up the Nyse and Nasdaq analysis into a large and small cap segment, we took the same values for both segments. Scores are based on relative deviations from the mean value for each category (1=very good, ..., 5=very bad). 5 was assigned for a negative deviation from sample mean of more than 50%, 4 for a negative deviation between 26 and 50%, 3 for an absolute deviation of 25%, 2 for a positive deviation between 26 and 50%, and 1 for a positive deviation of more than 50%.

Table 31: Results of the scoring model by small cap market segments

On the basis of such a simple scoring model it turns out that the Frankfurt Prime/General Standard seems to be the most attractive market segment among all the large cap segments, while the Frankfurt Entry Standard seems to be the most attractive among the small cap segments. For both market segments it is true that in any dimension they get at least an average grade, while in some they get an excellent one. On position two there is the Hong-Kong Main Board as far as large cap segments are concerned, while for the small caps Nyse is the second best alternatives. However, the gap between Prime Standard and Hong-Kong Main Board seems to be quite substantial, while the gap between Main Board and the other large cap segments under consideration is not that large anymore. Also for the small cap segments the gap between the Entry Standard and Nyse is quite large, while Nyse, Alternext and Nasdaq are relatively close to each other. AIM as well as the Hong-Kong GEM, however, follow with a quite substantial distance.