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The Clustering of IPO Gross Spreads: International Evidence

Sami Torstila*

Abstract

Patterns of clustering in IPO gross spreads can be identified not only in the U.S., but also in many other markets across the world. The evidence indicates, however, that these clustering patterns are not necessarily collusive. Clustering is widespread in many countries with low gross spreads. In fact, the amount of clustering observed is negatively related to the gross spread level of a country. Additionally, an analysis of abnormal gross spreads following Hansen (2001) indicates that few clusters contain abnormal positive surpluses.

I. Introduction

Chen and Ritter (2000) recently made the issue of underwriter compensation a focal point of IPO literature. Their paper shows that underwriting fees for medium-sized IPOs in the U.S. have a tendency to cluster at 7%. This finding sparked both a U.S. Department of Justice antitrust investigation (see Smith (1999)) and an academic debate about the nature of the clustering. Is clustering an efficient standardization of the IPO underwriting contract or, alternatively, an anticompetitive practice based on tacit collusion?

Chen and Ritter (2000) state that they favor a strategic pricing, i.e., tacit collusion explanation for the phenomenon. Other recent papers, however, take issue with the collusive argument.

Hansen (2001) uses a number of different tests in assessing whether the U.S. gross spreads contain collusive rents. He examines concentration in the U.S. underwriting market, barriers of entry into underwriting, the frequency of 7% spreads after the announcement of antitrust investigations, and constructs a test of abnormal gross spreads. Hansen's conclusion is that the 7% U.S. gross spreads

*torstila@hkkk.fi, Helsinki School of Economics, PO Box 1210, FIN-00101 Helsinki, Finland.
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are unlikely to be collusive and argues that they are part of a standardized IPO contract where the true competition takes place on quality.

Ljungqvist et al. (2002) study the international markets and focus on the connection between underpricing and gross spreads. They find that although foreign issuers pay more to get a U.S. lead bank to arrange a bookbuilding IPO, they also end up with lower underpricing. The higher direct costs are more than offset by savings in money left on the table.

The prior literature does not, however, systematically examine clustering patterns of IPO spreads in markets other than the U.S. This paper is the first to address clustering using comparative international data. While the potential clustering in other IPO markets is interesting in its own right, it can also shed light on whether its background is collusive.

The paper analyzes the clustering patterns of gross spreads in IPOs across the world with a data set containing nearly 11,000 IPOs from 27 countries ranging from 1986 to August 1999. The sample is obtained by using a unique combination of data from Capital Data Bondware (also known as IFR Bondware or Equityware) and Securities Data Corporation New Issues databases. The data are analyzed on both firm and country levels.

In several Asian markets, the data show even more pronounced clustering than in the U.S.: 95% of all IPOs in Hong Kong, 86% of the IPOs in India, and 56% in Singapore have gross spreads of 2.5%, while 89% of Malaysian IPOs have a gross spread of 2%. There is less clustering of fees in Europe, but some exceptions must be noted. Clustering is observed particularly in Germany (excluding the Neuer Markt[1]), where 62% of all IPOs have a gross spread of 4%. The French sample shows some clustering at 3% and the Belgian sample at 2.5%.

Are the clustered gross spreads collusive or not? The paper evaluates this question using three different approaches. Firstly, clustering of gross spreads is widespread not only in countries with high gross spreads such as the U.S., but also can be found in many countries with low gross spreads where one has little cause to suspect collusion.

Secondly, country level analysis of the data in fact shows that the more clustering there is in a country, the lower the general level of gross spreads. If clusters are collusive, one would expect the opposite—collusion should lead to higher gross spreads, not lower. The paper also examines the determinants of gross spread levels on country level data. High mode gross spreads in a country are linked to the use of bookbuilding, rather than to intense clustering. The bookbuilding result supports the firm level findings of Ljungqvist et al. (2002).

Finally, a firm level analysis based on a model of non-cluster observations as in Hansen (2001) suggests that few cluster IPOs contain positive abnormal gross spreads. Interestingly, however, one group where abnormal positive spreads appear to exist are larger U.S. IPOs with a 7% gross spread. The firm level data also shows that the U.S. market has gross spreads that are generally more responsive to IPO size than any other country examined. This fact makes the existence of larger U.S. IPOs with 7% gross spreads stand out even more.

[1]Launched in March 1997, the Neuer Markt is a new segment of the Frankfurt Stock Exchange, which includes primarily small technology companies.

The rest of this paper is organized as follows. Section II describes the data used. Section III presents an overview of gross spread clustering patterns in IPO markets around the world. Section IV analyzes the firm level data for abnormal gross spreads and responsiveness to IPO size. Section V shows, through an examination of the aggregated country level data, how lower gross spread levels are associated with more clustering. Section VI concludes.

II. The Data

The sample used in this study is obtained by combining data from the Capital Data Bondware and Securities Data Corporation (SDC) New Issues databases. SDC has been used in a wide number of prior studies concentrating on the North American market, and is considered the standard source. In this study, North American and Asian IPOs are obtained from SDC data. For Europe, however, cross-checking the SDC data revealed a number of inaccuracies, such as misclassifications of seasoned offerings as IPOs. The Capital Data Bondware database was chosen as the source of data for European IPOs after comparisons of European data quality.[2] This unique combination of two data sources has the objective of ensuring the best possible coverage for each geographical region.

The gross spread or underwriting discount forms the bulk of the underwriter's compensation. This compensation is defined as a percentage (or equivalently, monetary) commission per share to the underwriting syndicate. In an IPO with an issue price of $30 and a gross spread of 5%, the syndicate would receive $1.5 for each share sold. This commission is divided among the members of the syndicate according to their roles, with the lead manager receiving the largest proportional share.

The initial sample included all IPOs in the data between 1986 and August 1999, excluding IPOs with gross proceeds under U.S.$1 million, closed-end funds, REITs, and ADR listings. ADR listings were excluded in the U.S. but not in the country of origin of the stock. This resulted in an initial sample of 13,574 IPOs, of which 5,045 were from the Asia Pacific markets, 811 from Europe, and 7,718 from North America. Next, the IPOs where no spread data was available were excluded. Additionally, IPOs from countries with less than five spread observations were excluded. The final sample of IPOs with spread data includes 10,990 IPOs, of which 3,199 are from Asian Pacific markets, 469 from Europe, and 7,322 from North America. In addition, several robustness tests are conducted using various firm or time period subsamples.

The availability of gross spread data varies from country to country. In the North American region, gross spread data was available for 95% of all IPOs, while Asian Pacific IPOs had spreads in 69% of the cases and European IPOs in 58% of the cases. On a country-by-country basis, the U.S. has gross spread data available for 97% of IPOs, while Indonesia has gross spread data only for 7% of IPOs. Other countries fall between these two extremes. Major stock markets where no sufficient gross spread data was available include Japan. The IPOs where spreads are not available are on average smaller. In Europe, for example,

[2]See also Ljungqvist et al. (2002) for a detailed discussion of the quality of the Bondware data.

the median gross proceeds were U.S.$43 million for IPOs with no gross spread data and U.S.$100 million for IPOs with gross spread data (averages U.S.$77 and $409 million, respectively).

III. Clustering Patterns around the World

An examination of the spreads observed in each country reveals a wide variety of clustering patterns. These are described quantitatively in Table 1 and graphically in the scatter diagrams in the Appendix. Table 1 provides descriptive statistics for the spread levels in each country. Among them are two measures that play a key role in this paper, namely the mode gross spread in each country and the relative frequency of that mode.

TABLE 1

Clustering and Spread Levels in IPO Markets around the World

	Mode Spread		Three Most Common Spreads, Total		Avg.	Gross Spread (%)				
Countries	Level (%)	Relative Frequency	Relative Frequency	No. of Under-Writers	Gross Proceeds (US$m)	Value-Weighted Avg.	Equally Weighted Avg.	Median	Std. Dev.	*N*
Australia	4.00	21.2%	52.2%	134	65.0	2.2	3.8	4.0	1.9	278
Hong Kong	2.50	94.8%	97.8%	98	33.7	2.8	2.6	2.5	0.7	268
India	2.50	86.0%	96.8%	206	3.2	2.3	2.4	2.5	0.8	2065
Indonesia	3.50	27.3%	54.5%	10	192.1	3.6	3.9	3.5	1.4	11
Malaysia	2.00	88.8%	94.1%	27	13.0	1.8	2.0	2.0	0.2	392
New Zealand	nm	nm	nm	5	56.2	4.9	4.8	5.5	2.1	5
Philippines	3.00	65.4%	80.8%	17	99.7	3.1	3.2	3.0	1.1	26
Singapore	2.50	55.7%	74.3%	35	34.6	1.8	2.4	2.5	0.6	140
Thailand	3.00	42.9%	71.4%	8	94.6	3.0	2.9	3.0	0.5	14
Total Asia Pacific	2.50	66.7%	84.0%	519	15.6	2.4	2.5	2.5	1.0	3199
Austria	3.00	18.5%	40.7%	19	141.1	3.7	3.9	3.5	1.2	27
Belgium	2.50	66.7%	nm	10	296.5	2.9	3.1	2.5	1.3	12
Denmark	4.00	25.0%	75.0%	11	303.1	3.6	4.2	4.0	1.1	12
Finland	4.00	25.0%	58.3%	9	279.4	3.3	3.7	3.8	0.8	12
France	3.00	34.0%	52.0%	32	758.6	2.9	3.7	3.0	1.4	50
Germany	4.00	38.6%	62.5%	39	306.8	3.4	4.5	4.0	1.0	88
Greece	3.00	40.0%	nm	5	307.6	3.4	3.5	3.0	0.8	5
Ireland	nm	nm	nm	6	857.8	2.3	3.8	3.3	2.0	6
Italy	4.00	18.2%	34.5%	37	352.6	3.3	3.9	4.0	1.0	55
Netherlands	3.25	13.0%	29.6%	29	291.4	3.8	4.3	3.7	1.6	54
Norway	4.00	28.6%	nm	7	176.3	4.1	4.3	4.1	0.7	7
Portugal	3.25	16.7%	nm	12	407.2	3.0	3.5	3.5	0.8	12
Spain	3.50	26.5%	61.8%	28	230.1	3.1	3.3	3.5	0.6	34
Sweden	4.50	14.8%	37.0%	19	289.9	4.2	4.3	4.3	1.1	27
Switzerland	4.00	33.3%	66.7%	11	1022.6	3.1	4.0	4.0	0.9	12
U.K.	6.00	8.9%	23.2%	39	1037.7	2.2	3.8	3.6	1.9	56
Total Europe	4.00	15.6%	32.5%	205	454.7	3.0	3.8	4.0	1.1	469
Canada	6.00	18.3%	41.5%	145	32.9	5.1	6.7	6.5	1.6	749
U.S.	7.00	43.0%	62.8%	613	66.4	5.2	7.5	7.0	1.6	6573
Total North America	7.00	39.8%	60.4%	752	63.0	5.2	7.4	7.0	1.6	7322
All observations	7.00	26.5%	57.2%	1466	65.9	4.3	5.9	7.0	2.7	10990

Table 1 presents data on the clustering of gross spreads in IPO underwriting. The sample contains 10,990 IPOs from 1986 to August 1999. For each country, the table presents the mode gross spread and its relative frequency as a percentage of all IPOs in that country. The total frequency of the three most common spread observations is also shown. All monetary amounts in this paper are expressed in terms of millions of 4Q 1999 U.S. dollars. The number of underwriters refers to the number of firms that took part in that country's IPO market, with local subsidiaries and unique joint lead combinations counting separately. Where the number of observations in a country is small, the results should be interpreted with care or as not meaningful (nm).

The relative frequency of the mode in each country is measured in percentage terms, as the number of IPOs with the mode gross spread divided by the number

of IPOs with known spread information. This relative frequency is the measure of clustering in this study.[3] As some countries exhibit more complex patterns of clustering, with several "standard" gross spreads, Table 1 also reports the total percentage frequency of the three most common spreads. The Appendix plots gross spreads against IPO log proceeds (measured in millions of U.S. dollars) in a similar fashion to Chen and Ritter (2000).

The general level of gross spreads in various countries merits a few comments. As noted by Chen and Ritter (2000), the gross spread level in the U.S. is easily the highest in the world, with an equally weighted average of 7.5%. Not only are 7% spreads prevalent (43% of all IPOs), but even 10% spreads are relatively common. The only country even close to these spread levels is Canada, with an equally weighted average of 6.7%. As a contrast, European IPOs have equally weighted average spreads of 3.8% and Asia Pacific IPOs of only 2.5%.

The most striking patterns of clustering are found in the Asia Pacific markets. In Hong Kong, 95% of all IPOs in the sample have a gross spread of 2.5%. Similarly, 86% of Indian and 56% of Singapore IPOs have gross spreads of 2.5%. In the Philippines, 65% of IPOs have a gross spread of 3%. The diagrams in the Appendix indicate that these clusters are almost independent of transaction size. In Malaysia, 2% emerges as the standard spread, with 89% of IPOs falling into this category. This is the lowest spread cluster observed in this sample. One can also note that Malaysia has a history of binding regulatory restrictions on IPO pricing and consequently, one of the highest levels of IPO underpricing in the world (see Loughran et al. (1994)).

Most of these markets show only one, very defined cluster of spreads. In India, however, 1% and 1.5% spreads are also very common. In Singapore, 2.25% emerges as the second most common spread.

Australia stands somewhat apart in the Asia Pacific region. In some respects, the scatter diagram bears some resemblance to Canada and the U.S.: gross spreads vary considerably depending on the IPO size, and clusters form particularly toward the upper end of the spread range. Four percent emerges as the most common spread, with 21% of observations; 5% and 6% spreads are also relatively common, bringing the total frequency of the three most common spreads up to 52% of IPOs. The equally weighted average spread of 3.8% is, however, much lower than in the U.S. and Canada.

In Europe, there is relatively limited evidence of clustering, but some exceptions stand out. At first, one notices that 40% of German IPOs have a 4% gross spread. If, however, we exclude IPOs on the Frankfurt Neuer Markt, a separate marketplace mainly for small technology stocks, the clustering stands out even more. There are 36 IPO observations on the Neuer Markt, of which only two have 4% spreads (the rest are in the range of 4%–6.5%). Of the remaining 52 German observations, 32, i.e., 62%, have a 4% spread. In a particular range of medium-sized offerings, this clustering is even more pronounced: if we choose to examine German IPOs with proceeds between $U.S.60 and 400 million, 91% of IPOs exhibit the 4% spread. The German pattern bears some resemblance to

[3]An alternative clustering measure extending to ±0.5% around the mode is used for some robustness checks.

the U.S. evidence shown by Chen and Ritter (2000),[4] in that the clustering is a phenomenon of a particular size range and not of the whole market as in most Asia Pacific countries.

Some weaker evidence of clustering seems to exist in France, where 34% of the IPOs have a spread of 3%, and in Belgium, where 67% of the IPOs have a spread of 2.5%. In France and Belgium, this standard spread seems to be relatively unaffected by the size of the IPO. The different levels at which spread clustering takes place in different countries suggest that issuers use the national market as a benchmark. In other words, German issuers look at previous IPOs in the German market and Belgian issuers at the Belgian market, resulting in clustering at different levels in different markets.

The U.S. evidence has been covered in detail by Chen and Ritter (2000). Seven percent emerges as the most common U.S. spread in this study also, with 43% of IPOs; 10% spreads are somewhat common (16% of IPOs). In Canada, the most common spread level is 6%, but the clustering is much less pronounced than in the U.S.

Where countries seem to have more than one cluster, such as India, it is of interest to examine whether the second cluster is due to a particular industry or type of offering. Country by country analysis of the data, however, fails to observe such links—industries tend to have the same mode gross spread as the general IPO population of that country. Another way of looking at this is to examine whether IPOs that do not fall within a cluster in a particular country exhibit similar characteristics. For example, does the 5% of Hong Kong IPOs that does not have gross spreads of 2.5% have something in common? In this case, about half of these outliers consist of radio/TV or telecommunications IPOs. Mostly, however, industry spread patterns seem to conform to the spread pattern in each country.

In the U.S. market, Chen and Ritter (2000) report an increase in clustering over time. Figure 1 shows the relative annual frequencies of the mode spread for the major markets in this study. In contrast to the U.S., there do not seem to be significant increases in clustering over time in other markets. In addition to the U.S., only Singapore seems to be converging toward its national mode spread.

According to Rotemberg and Saloner (1986), collusion should be more likely to break down during booms.[5] This is because during periods of high activity, the momentary gains from defecting from collusion are relatively high and the long-term losses relatively low. During the IPO boom of 1999, clustering continued to increase in the U.S., Canada, and Australia, while it decreased in Germany. If this clustering was collusive, it did not appear to be breaking down during the latest IPO boom.

[4]The range of medium-sized offerings where Chen and Ritter (2000) find most clustering is $20 to $80 million, which is lower than the size range where clustering takes place in Germany.

[5]Chen (1999) reaches a somewhat different conclusion and argues that it is easier for investment bankers to collude in hot IPO markets. He attributes this difference to a different definition of booms: the Rotemberg-Saloner (1986) is based on future volume vs. present volume, while Chen's is based on future volume vs. the current transaction.

FIGURE 1
Clustering of Gross Spreads over Time

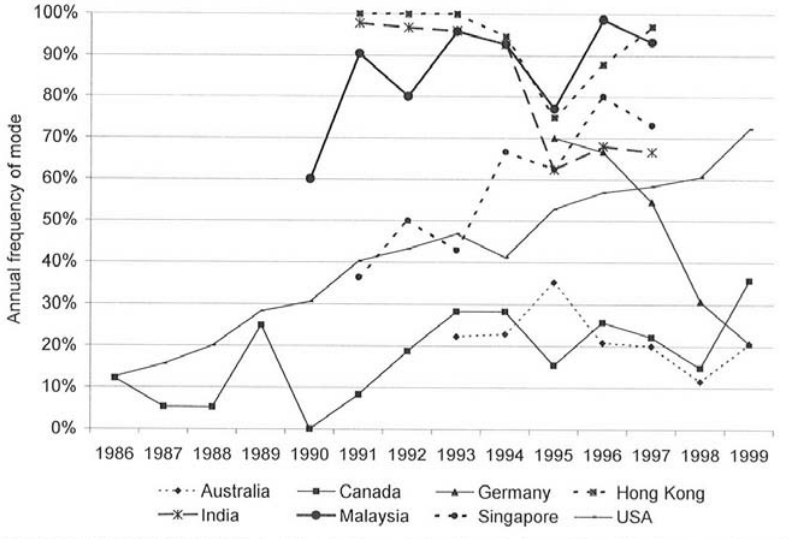


Figure 1 presents trends in clustering over time for the markets with most observations. The frequency shown is that of the overall national mode spread, as a percentage of the annual number of IPOs in that country. Averages are not shown when a country has less than 10 observations in a given year.

IV. Firm Level Analysis

A. Analysis of Potential Surplus Profits in Clusters

The fact that we observe clusters does not necessarily imply that they are collusive. As suggested by Hansen (2001), the standard pricing could also be a simple standardization of the IPO underwriting contract, with the real competition taking place through quality related variables.

In a perfectly competitive market, the long-run equilibrium price should equal the marginal cost of production, leaving firms with zero abnormal profits. It has been long recognized, however, that in oligopolistic markets, firms have an incentive to collude to keep prices above that level. The idea of non-explicit (i.e., tacit) price coordination between oligopolists dates back to Chamberlin (1929), and has sparked a number of theoretical and empirical applications over the years (see Tirole (1988)). In an extreme case, oligopolists would coordinate their actions perfectly and act like a monopoly, maximizing their total profits. More commonly, however, one observes cases of tacit collusion, where firms engage in price coordination without explicit cooperation, often following unwritten industry rules, such as standard fees. Relevant models of collusion have been presented by, e.g., Rotemberg and Saloner (1986) for cyclical markets, Dutta and Madhavan (1997) for the dealer markets, and Chen (1999) for the IPO market.

Collusive gross spreads should contain abnormal profits. The existence of such abnormal profits is highly difficult to measure directly. One way would be to estimate personnel costs, which are likely to be quite high in a fairly labor-

intensive sector such as investment banking. Perhaps lower spreads in emerging markets are simply a sign of lower wage costs.

To test this idea further, I obtain estimated annual compensation data from the salary calculator provided on the Web site of *The Economist*[6] as of January 21, 2002. I use the category Financial Analysis-Manager, which seems to accurately reflect investment banking salaries in those countries where I have independent information. When I have a choice of a city, I use the country's major financial center. The results are shown in Figure 2. The correlation between salaries and mode gross spreads is positive (0.30) but not significant at conventional levels. The U.S. has the highest salaries and gross spreads in the sample. On the other hand, many countries such as Singapore and Hong Kong where banker salaries are among the highest in the sample have very low gross spreads at 2.5%. Gross spreads do not appear to be directly related to banker salaries.

FIGURE 2
Salaries vs. Mode Gross Spreads

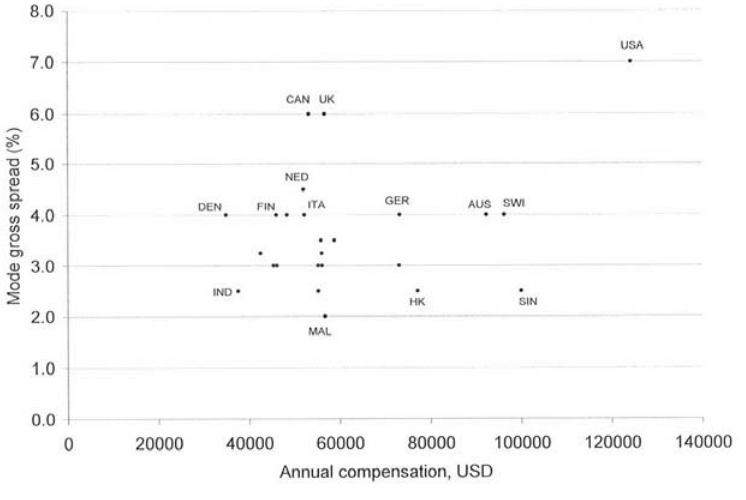


Figure 2 presents data on banker salary levels (source: The Economist Web site as of January 21, 2002) vs. the mode gross spread in each country. The abbreviations used in the figure are as follows: AUS = Australia, CAN = Canada, DEN = Denmark, FIN = Finland, GER = Germany, HK = Hong Kong, IND = India, ITA = Italy, MAL = Malaysia, NED = Netherlands, SIN = Singapore, SWI = Switzerland.

A more formal methodology can be based on abnormal gross spreads. Hansen (2001) applies such a model to the U.S. data. He finds that the U.S. gross spreads clustered around 7% could be expected to be even higher based on a simple model of the non-cluster gross spreads.

The following extends Hansen's (2001) approach to the international markets. The results are reported in Table 2. Only countries with at least 30 non-cluster observations are used for this analysis. Similarly to Hansen, a parsimonious gross spread model is estimated for each country. This is done through a

[6]Click the link "Salary comparison" at http://www.economist.co.uk/globalexecutive/.

firm level regression of the country's non-cluster observations (those that do not have that country's mode gross spread).

TABLE 2

Analysis of Surplus Profits

	Non-Cluster IPOs: Gross Spread Model							Cluster IPOs: Potential Surplus			
	Constant	Log Proceeds	Privatization Dummy	Bulge Bracket Dummy	Adj. R^2	F	N	Cluster Level	Avg. Surplus	% w. Pos. Surplus	N
Australia	5.34**	−0.67**	—	0.92**	0.52	117.40**	215	4.00	−0.07	36%	59
	(42.51)	(−15.32)	—	(2.90)					(−0.86)		
Canada	8.35**	−0.75**	0.54	−0.19	0.51	211.26**	612	6.00	−0.44**	30%	137
	(110.79)	(−24.63)	(0.90)	(−0.66)					(−5.69)		
France	5.84**	−0.30	−0.96	0.42	0.27	5.03**	33	3.00	−0.78**	29%	17
	(6.41)	(−1.48)	(−1.16)	(0.59)					(−3.47)		
Germany	7.41**	−0.63**	—	0.84**	0.43	19.98**	51	4.00	−0.53**	26%	34
	(18.20)	(−6.28)	—	(3.30)					(−4.38)		
India	1.74**	−0.14	—	—	0.006	2.73	287	2.50	0.85**	100%	1776
	(15.23)	(−1.65)	—	—					(370.4)		
Malaysia	1.71**	−0.003	—	—	−0.02	0.002	42	2.00	0.29**	100%	348
	(9.60)	(−0.05)	—	—					(1961.3)		
Singapore	3.23**	−0.34**	−0.15	—	0.21	9.19**	62	2.50	0.05	55%	78
	(11.96)	(−4.02)	(−0.31)	—					(1.56)		
U.S.	10.51**	−0.95**	0.33	−0.07	0.60	1888.2**	3746	7.00	−0.31**	31%	2827
	(245.45)	(−59.25)	(0.57)	(−1.03)					(−24.79)		
U.S. large (over $80m)	9.94**	−0.82**	−0.03	0.05	0.40	161.09**	725	7.00	0.87**	100%	178
	(48.64)	(−21.66)	(−0.08)	(0.71)					(48.99)		
U.S. small (under $80m)	10.80**	−1.10**	—	−0.33	0.42	1077.3**	3021	7.00	−0.20**	41%	2649
	(185.13)	(−41.10)	—	(−3.22)					(−15.48)		

Table 2 follows the approach of Hansen (2001) in analyzing surplus gross spreads in IPOs. The samples used are IPO country samples from the years 1986–1999. First, a parsimonious gross spread model is estimated for each country using the sample of non-cluster observations. The results are reported on the left side of the Table. Second, this gross spread model is applied to the cluster observations to obtain expected spreads. The surplus for each IPO is defined as the mode gross spread of the country minus the expected spread from the model. These results are reported on the right side of the Table. A positive surplus suggests that the gross spread of the IPO is higher than expected. The analysis excludes countries with less than 30 non-cluster observations and outlying IPO observations that differ from the closest IPO by one or more gross spread percentage point or one or more log proceeds point. *t*-values are reported in parentheses under the coefficients.

** indicates significance at the 1% level and * at the 5% level. Significance tests are two-sided.

As an example, for the U.S. there are data and descriptive statistics for 6565 observations. Of these, 2827 have a 7% gross spread and 3746 do not. Table 2 first uses the 3746 non-cluster observations to estimate the model for "normal" spreads and next applies the model to the 2827 cluster observations, so that all the observations are used once.

Apart from the key variable log proceeds, the independent variables differ from those used by Hansen because of the limitations imposed by the international data. The results obtained for the U.S. data, however, are similar to Hansen's, suggesting that the change in specification does not have a major effect on the results.

A dummy for IPOs managed by the global U.S. bulge bracket banks is based on the findings of Beatty and Welch (1996) showing that higher reputation investment banks have higher gross spreads and the result of Ljungqvist et al. (2002) that U.S. banks charge higher spreads. The normally applied Carter and Manaster (1990) metric of investment bank reputation is not directly applicable in international markets because it includes only U.S. banks. Instead, it is applied indirectly

by defining the bulge bracket as the banks with a Carter-Manaster index of 8.88 or above as calculated by Carter, Dark, and Singh (1998). This results in a bulge bracket of seven U.S.-based banks corresponding well to general perceptions of the global leaders of the IPO business. Using a dummy for privatization IPOs is suggested by the finding in Torstila (2001) that European privatization IPOs have lower gross spreads even after controlling for size and other related variables.

Once the gross spread model has been estimated for a country, the coefficients obtained are applied to the cluster observations in that country. This gives an expected gross spread for every cluster IPO. The surplus for a cluster IPO is defined as its gross spread minus the expected gross spread. A positive surplus shows that the gross spread observation is higher than would have been expected based on other IPOs, and may contain abnormal profits. A negative surplus indicates the opposite.

Table 2 reports the average surplus is positive and significant only in two out of eight countries (India and Malaysia). Interestingly, however, splitting the U.S. sample by size reveals a significant difference. As a cut-off point, I use $80m log proceeds. For the smaller IPOs, I find that the 7% gross spreads do not contain abnormally high spreads: in fact, the average surplus measure is significantly negative. The negative surplus for the smaller IPOs appears largely driven by many small IPOs with 10% gross spreads.

For the larger U.S. IPOs, however, the 7% gross spreads do contain a significant positive abnormal return component. These results, which are consistent with those reported by Hansen (2001), suggest that 7% gross spreads are particularly suspicious in the larger offerings.

The results reported in Table 2 exclude outliers, although including them does not materially change the results. Outliers are defined as observations that differ from the closest IPO by one or more gross spread percentage points or one or more log proceeds points. This excludes several large privatizations. The results are also robust to leaving out the bulge bracket dummy.

The results for India and Malaysia must be interpreted with great caution due to these countries' atypical gross spread distributions. India, for example, essentially has two major clusters at 2.5% and 1.5% and relatively few other observations. Since the 2.5% cluster is larger, the gross spread model is mostly estimated using the 1.5% secondary cluster, which results in a large positive surplus for India.

B. Gross Spread Responsiveness to IPO Size

An alternative approach to the firm level data is to conduct regression analysis on the full sample of nearly 11,000 IPOs. Excluding outliers as defined in Section IV.A reduces the sample to 10,973. The focus of the analysis is on the responsiveness of the gross spread percentage to IPO log proceeds (measured in millions of 4Q 1999 U.S. dollars). Log proceeds have been found to be a key determinant of the gross spread in numerous previous studies such as Beatty and

Welch (1996), Lee et al. (1996), and Ritter (1987). This has been generally attributed to significant economies of scale in the underwriting business.[7]

The responsiveness of the gross spread to IPO size could be indicative of a changing level of competition in the market. If the market becomes more competitive and less prone to collusion as IPO size increases (as suggested in Chen (1999)) the relationship between IPO size and gross spreads may appear relatively responsive.

The regression analysis studies this effect by including country dummies and country * log proceeds cross-terms among the independent variables. The U.S. is left without a dummy and acts as the benchmark. The variables have a straightforward economic interpretation. Canada, for example, has a country dummy coefficient of −2.09 and a country * log proceeds variable coefficient of 0.24. Both are significant at the 1% level. The interpretation is that other things being equal, a Canadian IPO will have a gross spread 2.09% lower than a U.S. IPO, but that this gross spread will decrease by 0.24% less (per log proceeds unit) than in the U.S. as IPO size increases.

The full results of the firm level regression analysis are shown in Table 3. The dependent variables are the individual gross spreads. *t*-values are calculated using White's (1980) heteroskedasticity consistent standard errors. In addition to country and cross-dummies, the regression includes the same independent variables as the regressions of Section IV.A and a set of industry[8] and year dummies. The results are robust as to whether the bulge bracket dummy is included or not. Two specifications are shown, the first with country dummies and the second with Europe and Asia Pacific dummies. In specification one, all countries have negative continent/country dummies, and positive cross-dummies with size. For all but one country, these results are significant at least at the 5% level.

TABLE 3

The Gross Spread—IPO Size Relationship Country-by Country
(dependent variable: gross spread)

	Specification 1		Specification 2	
Independent Variables	Coeff.	*t*-Value	Coeff.	*t*-Value
Constant	10.75**	128.71	10.32**	115.82
Offering characteristics:				
Log proceeds	−0.95**	−74.46	−0.84**	−64.40
Privatization dummy	−0.50**	−4.07	−0.49**	−4.62
Asia-Pacific dummy			−7.47**	−135.39
Europe dummy			−4.82**	−20.86
Asia-Pacific dummy * log proceeds			0.87**	44.43
Europe dummy * log proceeds			0.56**	12.41

(continued on next page)

These results show that the U.S. gross spreads are comparatively high, but also relatively responsive to IPO size. For a similar increase in log proceeds, U.S. gross spreads tend to decrease more than in any other country. This overall

[7] Altinkiliç and Hansen (2000), however, disagree with this view and argue that any given issuer faces increasing gross spreads after an optimum size range.

[8] Supplementing or replacing the industry dummies with a high tech dummy makes no difference to the results.

TABLE 3 (continued)

The Gross Spread—IPO Size Relationship Country-by Country
(dependent variable: gross spread)

Independent Variables	Specification 1		Specification 2	
	Coeff.	*t*-Value	Coeff.	*t*-Value
Underwriter characteristics:				
Bulge bracket underwriter dummy	0.03	1.22	−0.005	−0.20
Bulge bracket dummy * Asia-Pacific dummy			0.93**	2.78
Bulge bracket dummy * Europe dummy			0.62**	5.36
Country dummies:				
Australia	−5.34**	−41.17		
Austria	−6.19**	−8.08		
Belgium	−7.87**	−10.59		
Canada	−2.09**	−22.75		
Denmark	−5.06**	−4.05		
Finland	−5.90**	−6.79		
France	−5.82**	−9.94		
Germany	−4.80**	−14.86		
Greece	−4.75**	−3.99		
Hong Kong	−7.80**	−23.62		
India	−7.99**	−144.52		
Indonesia	−6.30**	−4.94		
Ireland	−2.27	−1.15		
Italy	−6.09**	−13.39		
Malaysia	−8.38**	−145.35		
Netherlands	−6.88**	−11.26		
New Zealand	−5.57**	−6.22		
Norway	−3.81**	−3.29		
Philippines	−7.88**	−16.87		
Portugal	−6.41**	−12.18		
Singapore	−7.56**	−62.85		
Spain	−6.59**	−11.07		
Sweden	−5.66**	−5.42		
Switzerland	−5.84**	−12.93		
Thailand	−10.11**	−9.76		
U.K.	−3.29**	−3.72		
*Country dummies * log proceeds:*				
Australia dummy * log proceeds	0.37**	8.57		
Austria dummy * log proceeds	0.92**	6.34		
Belgium dummy * log proceeds	0.98**	5.86		
Canada dummy * log proceeds	0.24**	8.09		
Denmark dummy * log proceeds	0.60*	2.02		
Finland dummy * log proceeds	0.77**	4.47		
France dummy * log proceeds	0.79**	8.58		
Germany dummy * log proceeds	0.65**	9.42		
Greece dummy * log proceeds	0.52*	2.22		
Hong Kong dummy * log proceeds	0.96**	8.89		
India dummy * log proceeds	0.92**	18.19		
Indonesia dummy * log proceeds	0.92**	4.26		
Ireland dummy * log proceeds	0.21	0.78		
Italy dummy * log proceeds	0.85**	9.54		
Malaysia dummy * log proceeds	0.93**	44.77		
Netherlands dummy * log proceeds	1.04**	8.80		
New Zealand dummy * log proceeds	0.90*	2.01		
Norway dummy * log proceeds	0.52*	2.30		
Philippines dummy * log proceeds	1.05**	11.49		
Portugal dummy * log proceeds	0.83**	8.44		
Singapore dummy * log proceeds	0.75**	18.47		
Spain dummy * log proceeds	0.83**	6.55		
Sweden dummy * log proceeds	0.86**	4.80		
Switzerland dummy * log proceeds	0.86**	8.84		
Thailand dummy * log proceeds	1.53**	7.07		
U.K. dummy * log proceeds	0.35**	2.71		
Year dummies	included		included	
Industry dummies	included		included	
No. of obs.	10973		10973	
Adj. R^2	0.87		0.84	

Table 3 shows the determinants of gross spreads using 10,973 observations of international firm level data. The bulge bracket is defined as in Table 2. The analysis excludes outlying IPO observations that differ from the closest IPO by one or more gross spread percentage point or one or more log proceeds point. *t*-values use White's (1980) correction for heteroskedasticity.

** indicates significance at the 1% level and * at the 5% level. Significance tests are two-sided.

size responsiveness makes the larger U.S. IPOs with 7% gross spreads stand out particularly.

V. Country Level Analysis

A. Determinants of Gross Spread Clustering

An alternative approach to the international data is to aggregate IPOs at the country level and examine which national variables explain variation in the clustering and level of gross spreads. Table 4 shows the pairwise correlations of some of the main variables used.

TABLE 4

Correlation Matrix

Pearson Correlations	Mode Gross Spread	% Frequency of Mode	Median Log Proceeds	Avg. Under-Pricing	No. of Analysts	Herfindahl-Hirschman Index
Mode gross spread	1.00**					
% frequency of mode gross spread	−0.55**	1.00**				
Median log proceeds	0.14	−0.57**	1.00**			
Avg. underpricing	−0.39	0.34	−0.09	1.00**		
No. of analysts	0.30	0.05	−0.04	−0.28	1.00**	
Herfindahl-Hirschman index	−0.43*	0.18	0.30	0.44*	−0.48*	1.00**

Table 4 presents Pearson correlation coefficients between some of the country level variables used in Tables 5 and 7. All variables are defined as in Tables 5 and 7.

** indicates significance at the 1% level and * at the 5% level. Significance tests are two-sided.

In the regressions reported in Table 5, panel A, the dependent variable is the prevalence of the major spread cluster, measured by the percentage frequency of the mode gross spread in each country.[9] In panel B, the dependent variable is the frequency of gross spreads within ±0.5% of the mode. Independent variables are used parsimoniously in regressions due to the relatively limited number of country observations available. A Breusch and Pagan (1979) test suggests that in the country level analysis, the null hypothesis of homoskedasticity cannot be rejected at conventional levels in any of the regressions.

If clustering were simply an indication of collusive practices, one would expect high clustering to be associated with a high level of gross spreads. The results in Table 5, however, show the opposite. Regressions indicate a negative relationship between the frequency of the mode and its level. The relationship between the two variables is illustrated graphically in Figure 3. The U.S., however, is an outlier, which can be interpreted as an indication that the U.S. mode gross spread is suspiciously high in comparison with the rest of the world.

It is possible that the underwriting markets are competitive for some size range of IPOs and collusive for others. Chen (1999), for example, argues that collusion becomes harder to maintain for large offerings. This implies a potential

[9]Of the 27 countries in the sample, Ireland and New Zealand are left out, as they do not have a meaningful mode spread due to a small number of observations. Denmark has an equal number of 4% and 5% observations. 4% is used as the mode as it is closer to the national average. In some countries the mode must be interpreted with care, as there are other gross spreads with almost the same number of observations.

TABLE 5

Determinants of Gross Spread Clustering

	Specification			
	1	2	3	4
Panel A. Dependent Variable: % Frequency of Mode Gross Spread				
Constant	0.80**	1.09**	0.85**	0.79**
	(5.70)	(7.66)	(4.22)	(5.83)
Mode gross spread	−0.11**	−0.10**	−0.12**	−0.10**
	(−3.12)	(−3.26)	(−2.92)	(−2.57)
Median log proceeds		−0.09**		
		(−3.48)		
Herfindahl-Hirschman index			−0.00003	
			(−0.36)	
Std. dev. of gross proceeds				−0.0001
				(−1.43)
Adj. R^2	0.27	0.51	0.24	0.30
N	25	25	25	25
Panel B. Dependent Variable: % Frequency of Mode Gross Spread ±0.5%				
Constant	1.02**	1.18**	1.04**	1.02**
	(10.57)	(10.80)	(7.43)	(11.58)
Mode gross spread	−0.11**	−0.10**	−0.11**	−0.09**
	(−4.43)	(−4.47)	(−3.96)	(−3.84)
Median log proceeds		−0.05*		
		(−2.40)		
Herfindahl-Hirschman index			−0.00001	
			(−0.14)	
Std. dev. of gross proceeds				−0.0001*
				(−2.37)
Adj. R^2	0.44	0.53	0.41	0.53
N	25	25	25	25

Table 5 consists of regressions investigating the determinants of gross spread clustering on a country-by-country basis. The dependent variable in panel A is the percentage frequency of the mode gross spread in each country. The dependent variable in panel B is the percentage frequency of gross spreads within ±0.5% of the mode in each country. Various specifications are tried out as to the independent variables. Ireland and New Zealand have no meaningful mode gross spread, and have been omitted from these regressions, leaving 25 observations. The Herfindahl-Hirschman index for each country has been calculated as the sum of the squared market shares (in percentage terms, as calculated from the number of IPOs). *t*-values are reported in parentheses under the coefficients.

** indicates significance at the 1% level and * at the 5% level. Significance tests are two-sided.

negative relationship between median IPO size and the clustering measure. The results in Table 5 show that this is the case in this data: IPO size is a negative and significant determinant of the clustering measure.

Higher concentration in the underwriting market could also lead to more clustering, as price coordination becomes easier (see e.g., Tirole (1988)). Market concentration is measured using the Herfindahl-Hirschman index based on the market share of underwriters. Table 4 shows a positive but insignificant correlation between the frequency of mode and the index. The sign is consistent with collusion, which is probably easier to maintain in a concentrated market (with a high HH index) rather than a fragmented one. The index, however, takes an unexpected negative sign in a regression setting (Specification 3 of Table 5).

The amount of variation in IPO size may also be a factor affecting the level of clustering. I measure the standard deviation of gross proceeds in each country and expect it to affect clustering negatively. The more variation there is in IPO size, the more variation one would expect to find also in the gross spread, given the differences in, e.g., marketing and selling costs between large and small offerings.

FIGURE 3
Clustering and Gross Spread Levels

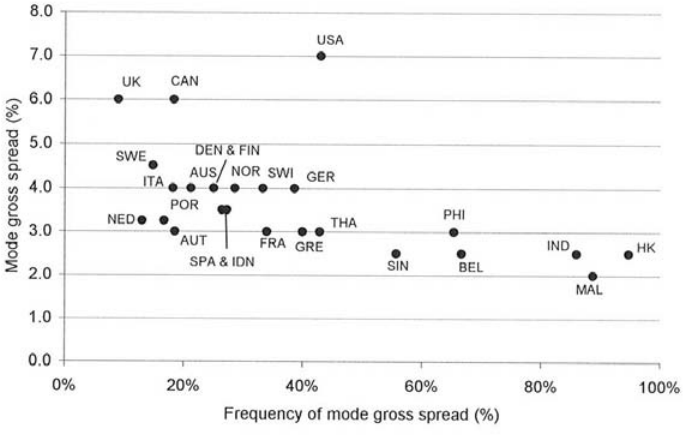


Figure 3 presents mode gross spreads and their relative frequencies for 25 countries in the sample. The *x*-axis represents mode frequency, a measure of clustering calculated as the number of IPOs with the country's mode gross spread as a percentage of all IPOs in that country. The *y*-axis represents the mode gross spread itself. The abbreviations used in the figure are as follows: AUS = Australia, AUT = Austria, BEL = Belgium, CAN = Canada, DEN = Denmark, FIN = Finland, FRA = France, GER = Germany, GRE = Greece, HK = Hong Kong, IDN = Indonesia, IND = India, ITA = Italy, MAL = Malaysia, NED = Netherlands, NOR = Norway, PHI = Philippines, POR = Portugal, SIN = Singapore, SPA = Spain, SWE = Sweden, SWI = Switzerland, THA = Thailand.

The results are reported in Specification 4 of Table 5. The variable takes the expected sign but is not significant at conventional levels. It does not affect the sign or significance of the mode/frequency relationship.[10]

The definition of the cluster requires its own robustness checks reported in Table 5, panel B. This is because some IPOs may be very close to the cluster level but fractionally above or below: perhaps U.S. IPOs with a 7.10% gross spread should really be considered part of the cluster. The analysis in panel B is rerun on an alternative cluster definition of mode ±0.5% inclusive. The relationship between the mode and its frequency remains negative and significant.

Another robustness check is to compare international clustering patterns only for IPOs of roughly similar size. For this purpose, I analyze a subsample of IPOs in the size range of $20–$80m gross proceeds. I consider two different definitions: i) a raw measure of gross proceeds between $20–$80m, and ii) a scaled measure of gross proceeds between $20–80m after multiplication by U.S. GDP per head and division by local 1999 GDP per head (GDP figures from *The Economist* (2001)). The latter measure is illustrated in Figure 4. For both measures, the relationship between the mode and the frequency remains negative. The U.S., however, becomes an even clearer outlier and the overall relationship is significant at the 5% level only if the U.S. is excluded.

Further robustness checks (unreported) are performed on certain subsamples. First, IPOs with proceeds under $10 million are excluded from the sample. Sec-

[10] An additional unreported variable investigated was the percentage of IPOs underwritten by U.S. bulge bracket banks. This could affect clustering if these banks in particular were operating collusively. However, no significant relationship was found.

FIGURE 4
Clustering and Gross Spread Levels: Similar-Sized IPOs

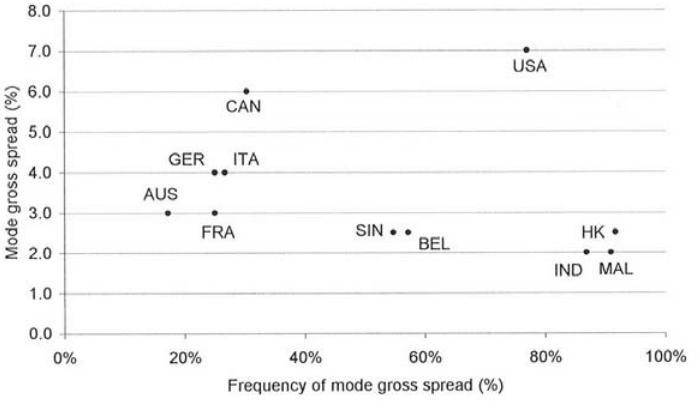


Figure 4 shows the relationship between clustering and gross spread levels for a subsample of similar-sized IPOs. The figure includes only IPOs with gross spreads between $20 and $80 million U.S. dollars after scaling by GDP per head (GDP source: The Economist, 2001). The sample is limited to 11 countries that have a meaningful mode gross spread in this size range. The abbreviations used in the figure are as follows: AUS = Australia, BEL = Belgium, CAN = Canada, FRA = France, GER = Germany, HK = Hong Kong, IND = India, ITA = Italy, MAL = Malaysia, SIN = Singapore.

ond, the subperiods 1990–1995 and 1996–1999 are examined separately. Finally, the analysis is performed on a country-industry basis for all national industry sectors with at least 10 observations (e.g., the Indian manufacturing sector). There are a total of 78 such national industry observations. In all cases, the result of a negative and significant relationship between the level and frequency of the mode spread is confirmed.

B. Determinants of the Gross Spread Level

A striking aspect of the data is the wide disparity of gross spreads globally. Why is the median gross spread only 2.5% in Asia Pacific, 4% in Europe, but as high as 7% in North America? The U.S., Canada, and the U.K.,[11] in particular, have the highest mode gross spreads in the sample. What makes these markets different? It is tempting to examine what country level data can add to the debate.

The institutional setting, of course, varies widely, and the role and responsibility of the underwriter is different from country to country. Sherman (2001) provides an extensive discussion of the variety of institutional arrangements in place around the world, particularly with respect to the spread of bookbuilding. Bookbuilding has been the primary underwriting method in the U.S. and Canada for the whole sample period of this paper, while it has gained popularity in the rest of the world only since the mid-1990s. Ljungqvist et al. (2002) report results showing that international IPOs using bookbuilding have higher gross spreads.

[11] The U.K., however, has median and average gross spreads more in line with continental Europe, while the mode happens to be higher in this data. The U.K. gross spread data has a high standard deviation, which could be due to the use of several different offering methods (placing, offer for sale, offer by tender).

Table 6 provides descriptive statistics for underwriting services in three country groups: the U.S., Canada, and the U.K. as one group, compared, respectively, to other common law countries and all other countries. For the first group of countries, some measures of underwriting service quality are also high. In the U.S., Canada, and the U.K., underpricing is lower, the number of analysts following companies is higher, and their forecast errors are smaller than in lower gross spread countries. Issuers in those countries may be getting higher quality services for a higher gross spread.

TABLE 6

Underwriting Market Characteristics of the U.S., Canada, and U.K.

	Avg. of Country Level Results from:		
	U.S., Canada, and U.K. ($N = 3$)	Other English Law Countries ($N = 6$)	Other Countries ($N = 16$)
Mode gross spread	6.3%	2.8%	3.5%
Median proceeds (US$m)	120.9	20.6	143.2
Underpricing	11%	39%	22%
No. of analysts	22.4	16.6	16.6
Analyst forecast error	5%	16%	24%

Table 6 reports averages of some country level variables for three groups of countries: 1) U.S., Canada, and U.K., 2) other countries with a legal system based on English law (following La Porta et al. (1998)), and 3) other countries in the sample. All figures in the table are averages of variables measured at the country level. Average underpricing is obtained from Loughran, Ritter, and Rydqvist (1994), as updated by Ritter (1999). The number of analysts and average forecast error are from Chang, Khanna, and Palepu (2000). The number of analysts used is the average number of analysts providing an annual earnings forecast per firm for the 30 largest firms, as calculated by Chang, Khanna, and Palepu (2000).

The analysis proceeds in Table 7 with regressions investigating the determinants of the mode gross spread using country level variables.[12] Numerous previous studies (see, e.g., Beatty and Welch (1996), Lee et al. (1996), and Ritter (1987)) have found a negative link between IPO size and the gross spread. At the aggregate country level, the relation between IPO size, measured by median log proceeds, and the gross spread is still negative but not significant at conventional levels, probably due to the much smaller amount of observations available in a country level analysis.

Specification 2 in Table 7 adds variables linked to the quality of services in the different markets. Similarly as in Table 6, the average level of underpricing in each country is used as reported by Loughran et al. (1994) and updated by Ritter (1999). The extent of analyst activity in each country is based on the results by Chang, Khanna, and Palepu (2000). The descriptive statistics of Table 6 tentatively suggest that higher quality of services may be associated with higher gross spreads. In a regression setting, however, neither of the variables is a significant determinant of the level of the mode gross spread at conventional levels of significance.

Specification 3 includes dummies for English origin legal system and bookbuilding. The English law dummy is based on the classification of La Porta et al. (1998) and the bookbuilding dummy on the classification of Loughran et al.

[12] Similarly as in Table 5, the results obtained are confirmed in an analysis of subsamples from 1990–1995 and 1996–1999.

TABLE 7

Determinants of Mode Gross Spread Level

	Specification		
	1	2	3
Dependent variable: Mode gross spread			
Constant	5.78**	4.06**	4.01**
	(5.79)	(5.84)	(19.06)
% frequency of mode gross spread	−3.33**	−2.49**	−1.56**
	(−3.26)	(−2.80)	(−2.87)
Median log proceeds	−0.21		
	(−1.19)		
Avg. underpricing		−0.86	
		(−0.73)	
No. of analysts		0.05	
		(1.53)	
English origin legal system dummy			−0.25
			(−0.80)
Bookbuilding dummy			2.94**
			(6.89)
Adj. R^2	0.28	0.33	0.82
N	25	24	25

Table 7 consists of regressions investigating the determinants of the mode gross spread on a country-by-country basis. The mode gross spread for each country is the dependent variable. Various specifications are tried out as to the independent variables. Ireland and New Zealand have no meaningful mode gross spread, and have been omitted from these regressions, leaving 25 observations. The average underpricing variable is obtained from Loughran, Ritter, and Rydqvist (1994), as updated by Ritter (1999). No underpricing data is reported for Indonesia in Ritter (1999), reducing the number of observations for Specification 2 from 25 to 24. The number of analysts used is the average number of analysts providing an annual earnings forecast per firm for the 30 largest firms, as calculated by Chang, Khanna, and Palepu (2000). The legal system dummy follows the classification of La Porta et al. (1998) and the bookbuilding dummy that of Loughran et al. (1994). *t*-values are reported in parentheses under the coefficients.

** indicates significance at the 1% level and * at the 5% level. Significance tests are two-sided.

(1994).[13] Only the bookbuilding dummy is a significant positive determinant of the mode gross spread. This reflects the fact that high gross spreads are not common to all English origin law (often also English speaking) countries. Rather, the dominance of the bookbuilding system appears more closely associated with higher gross spreads.

The country level analysis in this subsection must be interpreted with care as it relies on few data points and necessitates rough categorizations. The results obtained are, however, in line with firm level results reported by Ljungqvist et al. (2002). Ljungqvist et al. find that international bookbuilding offers have gross spreads twice as high as fixed price offers, despite the fact that bookbuilding typically involves lower risks for the underwriter than a fixed price offer. This higher direct cost is offset by lower underpricing for IPOs conducted by U.S. banks or marketed in the U.S. In other words, the reason why issuers are willing to pay more for U.S.-style bookbuilding may be that the gains from lower underpricing outweigh the higher direct costs.

[13]The bookbuilding dummy is attributed to countries where Loughran et al. (1994) report the most observations for "System B: setting of offer price after information acquisition with discretionary allocation."

VI. Concluding Remarks

The international evidence clearly shows that the phenomenon of IPO gross spread clustering is by no means limited to the U.S. market. The evidence suggests that these clusters are not necessarily collusive. Clustering is widespread also in low gross spread countries where one would not immediately suspect collusion. Most Asian stock markets, for example, have highly standardized IPO gross spreads, mainly at 2% and 2.5%. European IPO markets show less clustering of spreads than the U.S. markets, although clusters do appear, e.g., in Germany.

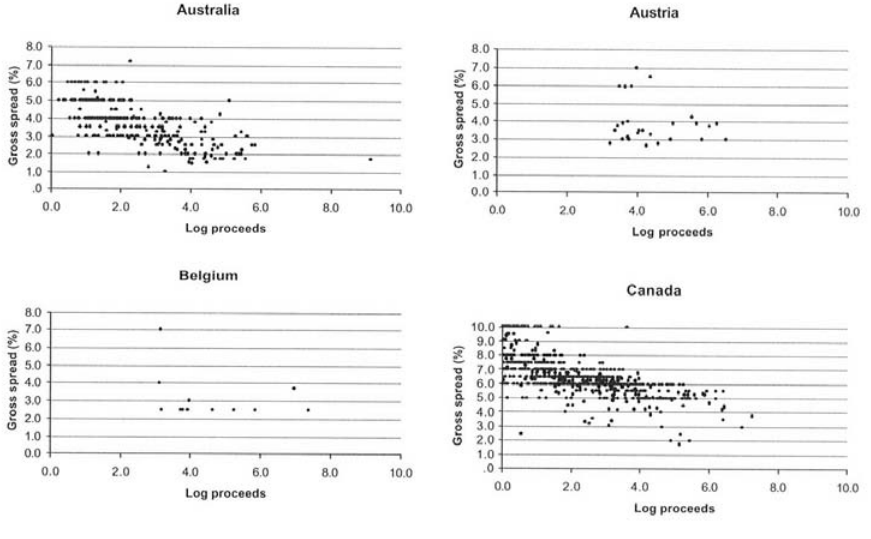
Moreover, the country level data indicates that clustering is in fact most severe in the countries with the lowest level of gross spreads. Countries where the overall level of gross spreads is high do not suffer from particularly intense clustering. If the clusters were collusive, one would expect more or less the opposite: collusion should lead to higher gross spreads, not lower.

Using firm level data, an extension of the approach used by Hansen (2001) also suggests that gross spread clusters in most countries do not contain positive abnormal surpluses. Interestingly, such positive abnormal surpluses do exist for a subsample of larger U.S. IPOs above $80 million gross proceeds. This result suggests that large U.S. IPOs with 7% gross spreads seem particularly suspect from a strategic pricing point of view.

APPENDIX

Proceeds and Gross Spreads of IPOs Country-by-Country

This figure shows the relationship between IPO proceeds and the gross spread (%) for 10,982 IPOs between 1986 and August 1999 country-by-country. The proceeds are shown as the natural logarithm of the U.S.$ proceeds (in millions of 4Q 1999 dollars), i.e., a U.S.$20 million offering shows as a log value of approximately 3 and a U.S.$400 million offering as a log value of approximately 6. Markets with fewer than 10 observations are not shown. As the large number of observations for India and the U.S. would clutter the diagrams, a random sample of 500 observations is plotted for these countries.



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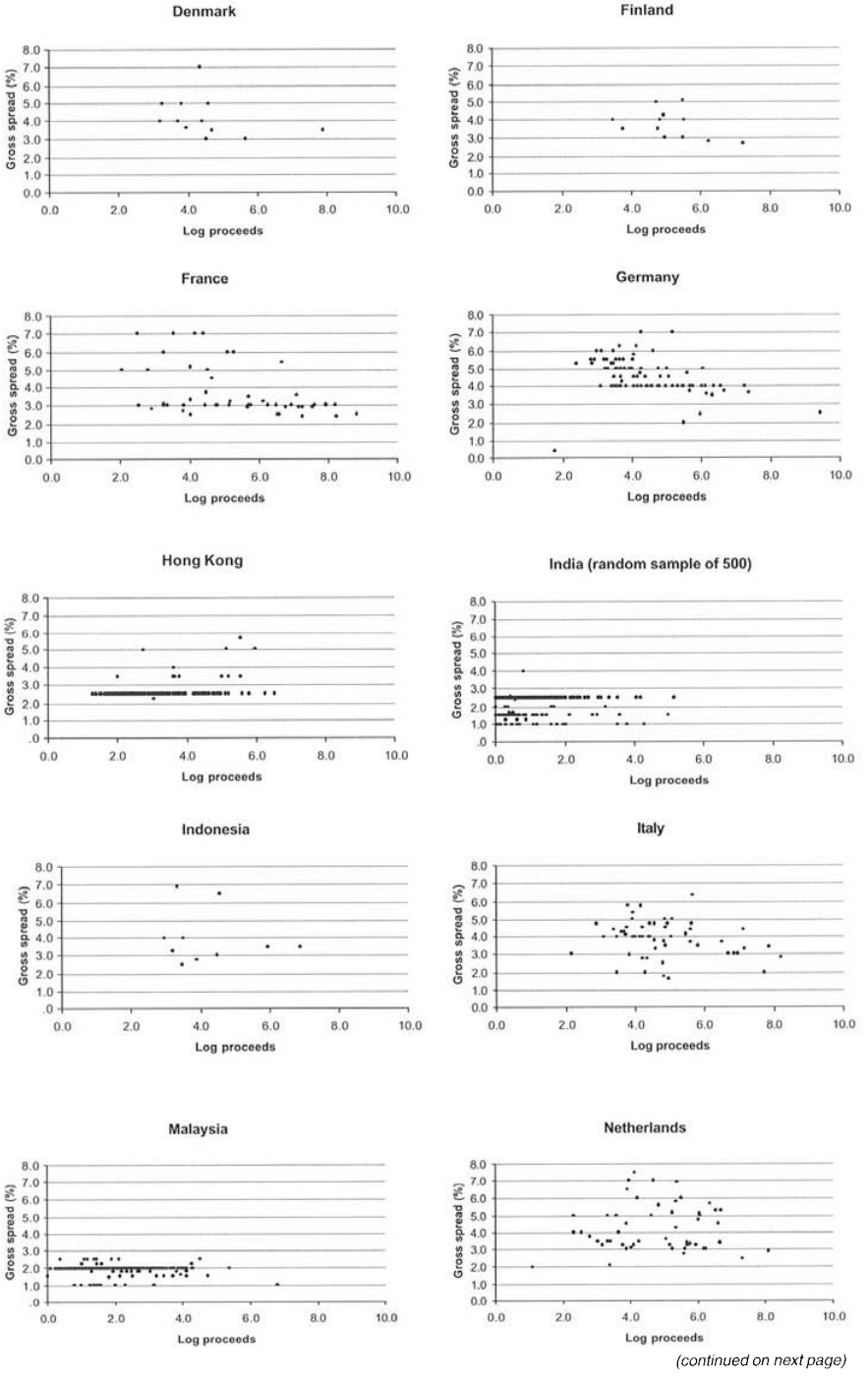
APPENDIX (continued)
Proceeds and Gross Spreads of IPOs Country-by-Country



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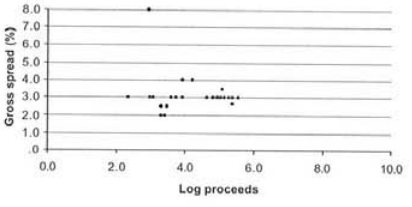
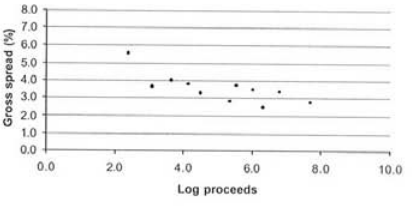
APPENDIX (continued)

Proceeds and Gross Spreads of IPOs Country-by-Country

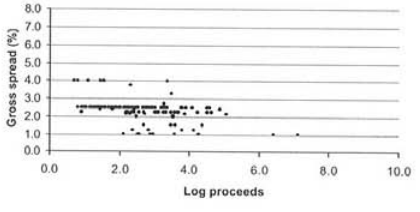
Philippines



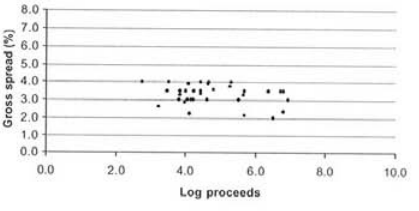
Portugal



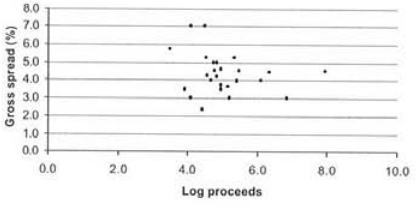
Singapore



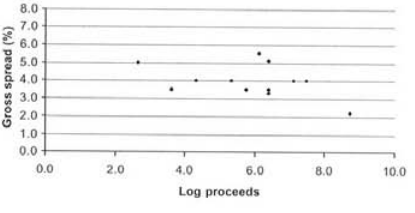
Spain



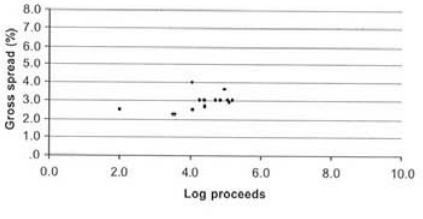
Sweden



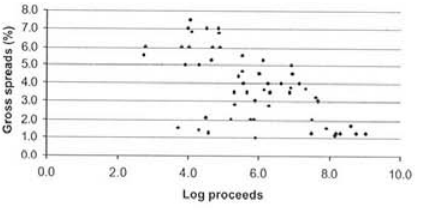
Switzerland



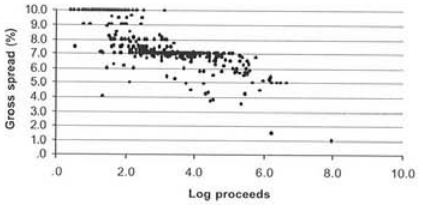
Thailand



U.K.



USA (random sample of 500)



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