

The Distribution of Information among Institutional and Retail Investors in IPOs

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Abstract

This study examines investor performance in IPOs using a unique database comprising 85,384 investors and 29 offerings from Finland. The evidence indicates that on average institutional investors do not obtain larger initial returns than retail investors, as the incentive to acquire information is limited by allocation rules which favour small orders. This result is in contrast to findings by Aggarwal et al. (2002), who show that institutional investors perform better in a bookbuilding environment. Within each investor category, however, large orders are associated with the best performance, suggesting that information differences figure more importantly within rather than between categories.

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1. Introduction

Models of investment behaviour frequently rely on a division into informed and uninformed investors. Large institutional investors are often seen as archetypal

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informed investors, while individual retail investors are thought to be uninformed. In the area of initial public offerings (IPOs), Rock's (1986) winner's curse hypothesis is built on a distinction between informed and uninformed investors. Prior studies such as Wang *et al.* (1992), Hanley (1993), Hanley and Wilhelm (1995), Ling and Ryngaert (1997), and Aggarwal *et al.* (2002) find that institutional investors receive above normal allocations in hot issues.

Is this evidence sufficient to draw the conclusion that institutional investors are better informed in IPOs? Not necessarily. Prior studies draw their data from IPOs using the bookbuilding method, i.e., where indications of interest are solicited from institutional investors before finalising the offer price. Institutional investors may do better in bookbuilding offers simply because they are being rewarded for their information gathering services. The information acquisition hypothesis in bookbuilding offers is discussed in Benveniste and Spindt (1989), Benveniste and Wilhelm (1990), Welch (1991), and Cornelli and Goldreich (2001).

To shed further light on the distribution of information among IPO investors, we also need to study institutional arrangements other than bookbuilding. The Finnish IPO market makes an excellent setting for an investigation of this type. In these IPOs, the offer price is set independently of the market response to the issuer's prospectus, leaving institutional investors only a passive role. Generally all applicants are allocated shares, and the allotment is normally based only on the size of the order and not, for instance, on the client's relationship with the investment bank. At the same time institutional investors do not feel obliged to participate in overpriced offerings in order to ensure that they can also participate in hot offers. Therefore, the investment banks' allocation policies have little effect on the analysis of the relative investment performance of institutional and retail investors.

This study is also the first to have access to panel data on IPO investors. The data contain detailed information on 85,364 investors and their orders and allocations in 29 IPOs. The data allow a direct evaluation of investors' performance in IPOs, whereas prior studies are limited to aggregate information on institutional IPO allocations.

The paper is organised as follows. Section 2 gives a detailed description of the database, which contains information on virtually all subscriptions in IPOs lead-managed by the leading Finnish investment bank, Kansallis Bank from 1987 to 1994. Section 3 examines how different investor classes perform in IPOs. Institutional investors appear no more skilful at selecting underpriced stocks than retail investors. Within each category, however, investors placing large orders achieve the best investment performance, suggesting that information differences figure more importantly within rather than between categories. Large investors and investors with superior stock selection skills vary the size of their orders across offers relatively more than smaller and less informed investors, suggesting that they are aware of their information advantage.

Section 4 discusses the results. The modest performance of institutional investors is attributed to the tendency of allocation rules to favour small subscriptions. This makes it difficult for any investor—whether retail or institutional—to derive much benefit from private information and limits the incentive to gather such information. In other words, the paper concludes that institutional investors are not *inherently* more informed than their retail counterparts: an institutional investor is unlikely to significantly outperform a retail investor if both put very little effort into information acquisition. Section 4 also discusses the implications of the results in terms of share allocation policy and the issuing company's post-IPO shareholder structure.

2. Data

The database consists of 29 IPOs lead-managed by Kansallis Bank and its investment banking subsidiary, Prospectus Ltd., between May 1987 and March 1994. The sample represents all the IPOs lead-managed by the Bank during this period except for one offering in 1988, which is excluded on the grounds of missing data. Table 1 provides some important characteristics of the sample IPOs.

The Bank originally processed all orders by computer, but the data tapes were no longer available when work began on this study. The database was therefore re-compiled from the original printouts of subscriber information. It is complete with the following two exceptions. First, a small number of printout pages relating to four offers were missing, producing a slight discrepancy between the total number of shares actually offered and the number according to the data. Second, order size printouts were available for only six and allocation size printouts for 28 of the 29 offers. However, in 13 of the 23 offers with missing order size data, these data could be recovered on the basis of the known relationship between orders and allocations (eight of these offers were undersubscribed and in the other five the allocation size was a piecewise linear function of the order size). In the offer where the allocation size printout was missing, the allocations were derived from the orders. The allocation-derived order and order-derived allocation figures are a little inaccurate, because published allocation rules were not always applied in the case of subscriptions by issuing company personnel or investment banks' regular clients. However, these rules cover all allocations for 94.0% of the investors, and all but one allocation for 5.8% of the investors. Moreover, of the remaining 0.2% or 173 investors, only nine are institutional investors. Therefore, any discrepancies between the actual orders or allocations and the data used in this study are relatively unimportant.

The accuracy of the investor identification numbers was verified using check-sum digits. Detailed data on investors were derived from the original identification code. Moreover, the total numbers of shares allocated or subscribed were checked against the totals in the printouts. The difference between the printout and database figures is generally less than 1000 shares, and typically zero.

In Finland investors can order shares by proxy. Unfortunately the data do not identify proxy orders, which were accepted in all the sample IPOs. By accepting proxy orders the investment banks increase demand for shares, since investors unable to visit the bank in person at the time of the offer can delegate the task of placing their order (telephone orders are generally not accepted). The issuer of the proxy is ultimately the legal owner of the shares, and it is his or her data which are registered in the bank's files.

The allocation rules for oversubscribed offers generally favour small orders, as these are rationed proportionally less. An investor can split a large order, and avoid rationing, by persuading others to issue proxies. The issuer of a proxy typically agrees to sell the shares allocated at a small profit to the holder of the proxy provided that this finances the deal and takes care of the paperwork. In other words, the proxy issuer typically only acts as an intermediary and the proxy holder is the actual end investor.

To assess the extent of proxy use, we analyse all subscription documents in one large branch office where, according to bank representatives, investing clients commonly used proxies. The analysis of 1,715 orders shows that no less than 42%

were by proxy; of the FIM65 million total order volume at the branch, 48% was by proxy (FIM6 \approx US\$1). On average, each proxy holder collected 2.78 proxies, although there was substantial variation; one investor collected 105 proxies in all, of which 17 were in one single offering.

Table 1
Characteristics of the sample IPOs.

The offer size is expressed in terms of the purchasing power of March 1994 Finnish markkas (FIM6 \approx US\$1). The market-adjusted initial return ar_i for the IPO i is calculated as follows (see Keloharju (1993) for details):

$$ar_i = \frac{P_{it} - P_{io}}{P_{io}} - \frac{I_{it} - I_{io}}{I_{io}} + \frac{r_{fio}(p_i - o_i)}{365},$$

where P_{it} is the average of the highest and lowest first trading day trade prices, P_{io} is the offer price, I_{it} is the value of the Helsinki Stock Exchange (HSE) value-weighted index on the first trade date, I_{io} is the value of the HSE value-weighted index on the first date of issue, r_{fio} is the one-month risk-free return on the first date of issue, and $p_i - o_i$ is the number of calendar days between the first date of issue and the last payment date for the shares.

IPO number	Company name	Offer date	Offer size (mill. FIM)	Market-adjusted initial return (%)	Number of investors	Order data available?
1	Olvi	5/18/87	15.95	105.24	6,808	No
2	Säkkiväline	10/12/87	30.59	46.64	8,948	No
3	Julius Tallberg-Kiinteistöt	11/2/87	62.77	2.46	1,969	Yes
4	Pohjois-Karjalan Kp.	11/16/87	57.94	1.35	745	Yes
5	YIT-Kiinteistöt	11/16/87	51.50	12.62	3,481	Yes
6	Kylpyläkasino	11/23/87	30.90	6.79	2,645	Yes
7	Larox	11/30/87	19.06	6.34	2,248	No
8	Muurame	11/30/87	16.74	10.85	2,793	No
9	Chips	12/7/87	83.46	0.37	3,913	No
10	Suomen Pörssikiinteistöt	1/14/88	176.62	-4.08	3,365	Yes
11	Jämerä-Kiinteistöt	2/11/88	126.54	-23.56	1,434	Yes
12	Leo Longlife	4/11/88	19.99	15.63	973	Yes
13	Hackman	5/9/88	104.11	41.25	10,578	No
14	Rakentajain Konevuokraamo	5/30/88	23.80	24.60	2,089	Yes
15	Viatek	6/6/88	14.33	104.00	5,130	No
16	Vaisala	6/13/88	50.75	-5.08	7,228	Yes
17	Valmet	8/15/88	959.94	-14.49	9,469	Yes
18	Lihapolar	8/22/88	81.23	43.50	24,477	No
19	Insinöörilehdet	9/12/88	34.29	-1.29	2,179	Yes
20	Itikka	9/12/88	75.00	7.66	21,950	No
21	Sophistics	10/3/88	28.34	49.63	2,466	Yes
22	Kesätunturi	10/4/88	15.60	-15.21	239	Yes
23	Finlandia Interface	11/15/88	18.23	4.51	289	Yes
24	Piretta	11/28/88	34.14	-2.61	719	Yes
25	Hartwall	4/24/89	93.49	2.13	7,466	No
26	Lemminkäinen	5/8/89	167.73	-4.10	5,504	Yes
27	Rautaruukki	6/7/89	520.52	8.87	20,861	Yes
28	Balansor	11/29/89	34.14	-6.97	513	Yes
29	Saunatec	3/23/94	24.63	15.52	1,312	Yes

3. Results

3.1. Introductory statistics

Table 2 shows the distribution of the sample investors into three main categories: *institutional investors*, *other firms*, and *individual investors*.

Based on the investor categorization code, institutional investors are further split into two subcategories: financial institutions and public and non-profit institutions. Financial institutions include all investors within the Statistics Finland financial institutions category, except for the category other private financial institutions. This category (481 investors in the sample) is excluded from institutional investors because it consists mostly of relatively small investment companies with a typical order size one-third that of other financial institutions.

Other firms include all firms and institutions except those categorized as institutional investors. All lines of business are represented, but the emphasis is on investment activities. (During the sample period, Finnish individual investors enjoyed certain tax benefits by transferring their securities transactions to their own personal investment company.) Investors in the other firms category are typically much smaller than the institutional investors—in fact the categorization code reveals that 62% are actually households.

Table 3 provides descriptive statistics on orders and investors’ performance in the sample offerings. Consistent with the winner’s curse hypothesis, IPOs with large initial returns attract more investors. Therefore, the mean of all investors’ equally weighted average percentage initial returns is substantially larger than the equally weighted average initial return for the 29 IPOs.

3.2. Participation patterns and proportional allocations

Table 4 details the participation and allocation patterns by investor category and offer type. The participation and allocation patterns are dramatically different: both

Table 2
Investor distribution by category.

Age is taken at the time of the investor’s first subscription. The proportions do not sum to their subtotals or to 100% due to rounding.

	Number	Proportion
Financial institutions	144	0.2%
Public and non-profit institutions	63	0.1%
Total institutional investors	207	0.2%
Other firms	11,462	13.4%
Males	46,692	54.7%
Females	27,023	31.6%
Total individual investors	73,715	86.3%
Totals	85,384	100.0%
	Years	
Mean age of investors	35.6	
Median age of investors	36.0	

Table 3.

Descriptive statistics on investment performance for the panel of 85,384 IPO investors.

The initial returns are market-adjusted returns, calculated exclusive of transaction costs. An investor's equally weighted average initial return is the mean of the initial returns in the offers in which the investor participates. The hit rate is the ratio of the number of times an investor achieves a positive initial return to that investor's total number of subscriptions. An investor's first-day profit in a given IPO is the product of the percentage initial return and allocation; the investor's total firstday profit is the sum of first-day profits across the sample offers. Order size statistics are shown for the 49,654 investors participating in the 19 offers for which order size data are available. The median order sizes are conditional upon placing an order. The first-day profits and order sizes are expressed in terms of the purchasing power of March 1994 Finnish markkas (FIM6 \approx US\$1).

Equally weighted average initial return for 29 IPOs	0.149
Offer-size weighted average initial return for 29 IPOs	0.011
Mean of 85,384 investors' equally weighted average initial returns	0.197
Proportion of 29 IPOs with positive initial returns	0.690
Mean of 85,384 investors' equally weighted hit rates	0.798
Mean number of times participated in sample offers	1.895
Mean of 85,384 investors' total first-day profits (FIM)	386
Median of 85,384 investors' total first-day profits (FIM)	552
Mean of 49,654 investors' median order size (FIM)	96,646
Median of 49,654 investors' median order size (FIM)	11,039

institutional investors and other firms end up with many more overpriced and, in particular, undersubscribed shares. Leaving aside asymmetries of information between the investor categories, this pattern can be explained by the following two factors.

First, institutional investors and other firms place much larger orders than individual investors, and therefore suffer more from the investment bank's practice of favouring small orders in the allocation of oversubscribed offers. Very few investors have a regular client relationship with the investment bank and are thus able to escape the general allocation principles: of the 85,384 investors, only 173 (of the 207 institutional investors, only nine) obtain two or more above-normal allocations of oversubscribed shares.¹ Therefore, even relatively well-informed investors placing large orders may end up with larger positions of undersubscribed shares with negative initial returns and smaller positions of oversubscribed shares with positive initial returns.

Second, the allocations shown in Table 4 also include shares allocated to underwriters. It is relatively straightforward to exclude the Bank's and single co-lead manager's allocations from the total allocation pool, but this does not allow for the allocations of other large investors who seem to have acted as if they had an

¹ Although not reported here, we test Benveniste and Spindt's (1989) idea that the underwriter may make investors' allocations in hot issues conditional on their willingness to participate in unfavourable offers. The results are inconsistent with the hypothesis that the 173 privileged investors are more active in undersubscribed offers than their category- and allocation-matched controls.

Table 4

Percentage breakdown of investor numbers and allocation proportions by investor category and type of offering.

Investor proportions refer to the relative number of investors in each investor category. Proportional allocations refer to the proportion of shares allocated to each category. The equally weighted averages are calculated across the sample IPOs, not across investors.

	Equally weighted averages of investor proportions (%)			Equally weighted averages of proportional allocations (%)			N
	Institutional investors	Other firms	Individual investors	Institutional investors	Other firms	Individual investors	
OTC companies	0.44	20.08	79.48	7.74	36.75	55.50	22
HSE listed companies	0.38	12.97	86.64	22.77	38.83	38.39	7
Best efforts offers	0.29	20.99	78.71	2.26	42.43	55.31	3
Underwritten offers	0.44	18.06	81.50	12.42	36.66	50.92	26
Small offer size	0.43	22.56	77.01	8.31	38.36	53.33	10
Medium offer size	0.46	17.70	81.83	8.34	38.36	53.31	10
Large offer size	0.39	14.43	85.18	18.15	34.80	47.05	9
Oversubscribed offers	0.31	18.97	80.73	2.10	33.38	64.51	21
Undersubscribed offers	0.74	16.79	82.47	35.70	47.41	16.89	8
Positive initial return	0.38	19.70	79.93	5.54	34.74	59.72	20
Negative initial return	0.54	15.40	84.06	24.32	42.85	32.83	9
All companies	0.43	18.36	81.21	11.37	37.25	51.37	29

underwriting obligation. For instance, of the 32 largest investors (total allocation in excess of FIM5 million), 22 (six institutional investors, 15 other firms, and one individual investor) have essentially assumed the role of underwriter. For each of these investors the largest single allocation is in an undersubscribed offer and represents at least 95% of the investor’s total allocation across the sample offers. Since the identities of these investors are not known, it is not possible to determine whether they are bank-affiliated institutions or simply unfortunate investors who have underestimated the winner’s curse. Their large number, however, suggests that most have no bank affiliation. At any rate, eliminating the 22 ‘underwriters’ from the total allocation pool reduces the allocation bias against institutional investors very little. Institutional investors’ average proportional allocation in undersubscribed offers is 22.1% and only 1.7% in rationed offers. The allocation bias against other firms also shows little change.

3.3. *IPO investment performance*

Table 5 measures investment performance by investor category. Other firms achieve the highest mean of equally weighted hit rates (defined as the ratio of the number of times an investor achieves a positive initial return to that investor’s total number of subscriptions) and highest mean of equally weighted average initial returns, making this investor category the most successful at selecting underpriced stocks. All differences are significant at the 5% level. The same two indicators of investor information advantage give opposite results for institutional investors and individual

Table 5

Descriptive statistics on investment performance by investor category.

The initial returns are market-adjusted returns, calculated exclusive of transaction costs. An investor's equally weighted average initial return is the mean of the initial returns in the offers in which the investor participates. The hit rate is the ratio of the number of times an investor achieves a positive initial return to that investor's total number of subscriptions. An investor's first-day profit in a given IPO is the product of the percentage initial return and allocation; the investor's total first-day profit is the sum of first-day profits across the sample offers. The aggregate total first-day profit for an investor category is the sum of the total first-day profits realized by the investors in that category. Order size statistics are shown for the 49,654 investors participating in the 19 offers for which order size data are available. Median order sizes are conditional upon placing an order. The unit of observation is a single investor in all the statistics except in the aggregate total first-day profit figures. The total first-day profits are expressed in terms of the purchasing power of March 1994 Finnish markkas (FIM6 \approx US\$1).

	Institutional investors				
	Financial institutions	Public and non-profit institutions	All institutional investors	Other firms	Individual investors
Equally weighted average initial return					
Mean	0.238	0.161	0.214	0.258	0.187
Standard error	0.021	0.037	0.018	0.003	0.001
Allocation-weighted average initial return					
Mean	0.160	0.122	0.149	0.220	0.170
Standard error	0.023	0.036	0.020	0.003	0.001
Equally weighted hit rate					
Mean	0.771	0.648	0.733	0.836	0.792
Standard error	0.025	0.058	0.025	0.003	0.001
Allocation-weighted hit rate					
Mean	0.653	0.615	0.641	0.803	0.776
Standard error	0.034	0.060	0.030	0.003	0.001
Median of median order size (FIM)	120,613	92,317	118,300	51,504	9,318
Median total allocation (FIM)	50,625	41,847	48,869	16,116	5,850
Median total first-day profit (FIM)	1,618	353	1,294	1,815	430
Mean number of times participated in sample offers	2.889	1.857	2.575	2.225	1.842
Aggregate total first-day profit (mil. FIM)	-72.72	-1.94	-74.66	-8.81	116.43
N	144	63	207	11,462	73,715

investors: institutional investors display a higher mean of equally weighted average initial returns and individual investors a higher mean of equally weighted hit rates. Only the latter difference is insignificant at the 5% level, however.²

²The above results are robust to the definition of institutional investors. Including other private financial institutions in the category of institutional investors decreases the mean of average equally weighted average initial returns to 0.197 and increases the mean of equally weighted hit rates to 0.780. In other words, the investment performance rankings of the three investor categories remain unchanged.

Because of the winner's curse, the allocation-weighted hit rates and initial returns are lower than the equally weighted equivalents. Institutional investors, in particular, suffer from discrimination against large orders and realize the lowest allocation-adjusted average percentage initial returns and hit rates.

Table 5 also provides the median total first-day profits by investor category. An investor's first-day profit in a given IPO is the product of the percentage initial return and allocation; the investor's total first-day profit is the sum of first-day profits across the sample offers. In other words, the total first-day profits indicate how much investors actually gain from their participation in Kansallis Bank's IPOs. In line with the earlier results, the median institutional investor gains less (FIM1,294) than the median other firm (FIM1,815). The median individual investor, who places a much smaller order and consequently obtains a smaller allocation, gains even less, FIM430. Taking brokerage fees (typically 1%) and transaction taxes (0–0.8%) into account further reduces these figures. Since many investors participate in more than one offer, the per offer figures are even smaller. Such small returns clearly give investors little incentive for a thorough analysis of a prospective investment.

In unreported analysis, we examine the sensitivity of investor demand to long-run returns by regressing the log of the number of investors in each investor class on the log of offer size, initial return, and market-adjusted returns on the first, second, and third post-offer years. Both offer size and initial return are positively and highly significantly related to the number of investors, whereas the coefficients for the aftermarket returns are not significant at conventional levels.

Table 6 examines investment performance by order size across the investor categories. Large investors are expected to earn greater returns as they have more capital at stake and, consequently, have more incentive to become informed. The same prediction applies to other sufficiently informed investors who believe that an offer is underpriced. These investors have an incentive to invest a considerable proportion of their wealth to take maximum advantage of their information.

The results clearly suggest that investors placing large orders are more skilful at selecting underpriced stocks: the two smallest order quintiles typically account for the poorest percentage returns and the two largest for the best. The difference in initial return between the largest and smallest quintile is significant at the 1% level for all investor categories. Moreover, all initial return differences between the largest and second-smallest and between the second-largest and smallest quintile are significant at the 5% level.

It is illustrative to compare these figures with the differences between the entire investor categories, which are 4–10% for the hit rate and 4–7% for initial return, as reported in Table 5. In other words, the information differences within investor categories seem to be at least as great as between the categories. Order size appears to signal more about a particular investor's level of information than the category the investor belongs to.

A possible economic interpretation of the phenomenon can be based on the much smaller wealth that individual investors typically command in comparison with institutional investors. For example, conditional upon submitting an offer, the median institutional investor's orders are approximately ten times as large as the median individual investor's. When, occasionally, an individual investor and an institutional investor place orders of similar size, the individual investor is likely to be risking a much larger total proportion of her total wealth. To take such a risk, the individual

Table 6

Relation between order size and investment performance.

Investors are divided into quintiles based on their median size of order. The number of investors in each quintile varies because several investors can have exactly the same median order size. The initial returns are market-adjusted returns, calculated exclusive of transaction costs. An investor's equally weighted average initial return is the mean of the initial returns in the offers in which the investor participates. The hit rate is the ratio of the number of times an investor achieves a positive initial return to that investor's total number of subscriptions. An investor's first-day profit in a given IPO is the product of the percentage initial return and allocation; the investor's total first-day profit is the sum of first-day profits across the sample offers. The median order sizes are conditional upon placing an order. The total number of investors (49,654) is smaller than the full sample size because order size data are available in 19 offers only. The average initial returns and hit rates are smaller than those shown in previous tables because the 19 offers for which order data are available produce lower initial returns than the remaining ten offers.

	Median order size				
	Smallest 1	2	3	4	Largest 5
<i>Institutional investors</i>					
Equally weighted mean initial return					
Mean	0.044	0.057	0.115	0.178	0.141
Standard error	0.026	0.029	0.030	0.033	0.024
Equally weighted hit rate					
Mean	0.585	0.588	0.542	0.694	0.627
Standard error	0.080	0.088	0.066	0.062	0.060
Median of median order size (FIM)	14,768	47,320	94,640	315,071	1,740,000
Median total allocation (FIM)	14,745	36,588	88,505	206,741	1,995,273
Median total first profit (FIM)	345	1,848	1,767	888	-37,490
N	28	25	29	30	29
<i>Other firms</i>					
Equally weighted mean initial return					
Mean	0.133	0.124	0.141	0.146	0.153
Standard error	0.004	0.004	0.004	0.004	0.005
Equally weighted hit rate					
Mean	0.761	0.638	0.787	0.742	0.706
Standard error	0.009	0.010	0.009	0.009	0.010
Median of median order size (FIM)	8,014	23,660	49,686	97,006	283,921
Median total allocation (FIM)	10,301	20,178	24,919	44,954	98,314
Median total first-day profit (FIM)	900	1,218	1,974	3,108	5,753
N	1,366	1,362	1,332	1,412	1,368
<i>Individual investors</i>					
Equally weighted mean initial return					
Mean	0.025	0.095	0.093	0.095	0.132
Standard error	0.002	0.002	0.002	0.002	0.002
Equally weighted hit rate					
Mean	0.525	0.622	0.645	0.623	0.791
Standard error	0.005	0.004	0.004	0.004	0.004
Median of median order size (FIM)	1,674	4,732	9,444	18,928	87,542
Median total allocation (FIM)	2,060	5,296	10,276	15,534	33,124
Median total first day profit (FIM)	56	420	840	1,168	2,940
N	8,451	8,932	8,225	8,531	8,534

investor could be expected to require more information. In other words, a retail investor is probably better informed than an institutional investor if both place similar-size orders.

3.4. Variability of order size

Uninformed investors are expected to maintain approximately the same order level across offers, since this is likely to result in less exposure to the winner's curse.³ While informed investors have the same incentive to maintain a stable order level, they also have an opposing incentive to vary their order size as a function of their information. In other words, well-informed investors are likely to vary their orders more than uninformed investors. Examining the variation of order size is therefore likely to provide direct evidence as to which investors act as if they were informed.

Table 7 analyses the extent to which investors in the different categories vary their order size across offers. Panel A contains descriptive statistics, while Panel B shows regression results for variations in order size on investment performance and investor categories. Investment performance, measured by average initial returns, acts as a proxy for the amount and quality of information available to an investor. The initial return is indeed significantly and positively associated with the coefficient of variation (coefficient of variation is the ratio of standard deviation to mean). This supports the idea that informed investors vary their order sizes more than their uninformed counterparts in attempting to take advantage of their superior information. The results are similar for another proxy of information availability, the median order size.

The significantly positive dummy for other firms indicates that these investors vary their order size more than individual investors. On the other hand, the coefficient for the institutional investor dummy is insignificant (although positive). The results are qualitatively similar if hit rates or allocation-weighted average initial returns are used instead of equally weighted initial returns, or if the number of offers participated in is controlled for. All in all, the results suggest that institutional investors do not vary their order size more than individual investors. In other words, institutional investors do not act as if they believe they have superior information relative to individual investors.

³To see this, consider an uninformed investor participating in IPOs. The offers may have two outcomes, a positive initial return (r_1) or negative initial return (r_2). The probabilities of these outcomes are p and $1 - p$, and the allocations as a function of order size x are $f(x)$ and x , where $f(x)$ is a concave function (because of the general tendency to favour small orders in oversubscribed offers, the actual number of shares allocated is typically a concave function of order size, whereas overpriced shares tend to be undersubscribed and the applicant is allocated the full order). If the investor participates in N offers and always places orders of size x , the expected payoff is $N[pf(x)r_1 + (1 - p)xr_2]$. Alternatively, if the investor believes that every $1/p$ th offer is underpriced and places an order of x/p in these Np offers and zero in the remaining offers, the expected payoff is $Np[pf(x/p)r_1 + (1 - p)(x/p)r_2]$. The difference in expected payoffs between the two strategies is $Npr_1[f(x) - pf(x/p)] > 0$, indicating that uninformed investors can decrease the winner's curse (i.e., the reduction in expected payoff) by maintaining the same order size across offers. Since this is also the least risky strategy, rational uninformed investors choose this option.

Table 7

Determinants of the coefficient of variation of order size.

The coefficient of variation of an investor's order size is the ratio of standard deviation to mean of order size. Offers where the investor has not placed an order are not taken into account in this calculation. The number of investors is smaller than in previous tables because the coefficient of variation can be calculated only if data are available for at least two orders. The *p*-values in parentheses are adjusted for heteroskedasticity.

Panel A: Descriptive statistics of coefficient of variation of order size

Coefficient of variation	Institutional investors				
	Financial institutions	Public and non-profit institutions	All institutional investors	Other firms	Individual investors
Mean	0.785	0.577	0.756	0.647	0.592
Standard error	0.079	0.102	0.070	0.009	0.004
Median	0.695	0.516	0.675	0.605	0.511
<i>N</i>	43	7	50	2,020	8,800

Panel B: Ordinary least squares regression

Independent variables	Dep. variable: Coeff. of variation of median order size
Intercept	-0.46 ($<5E-06$)
Institutional investor dummy	0.18 (0.62)
Other firm dummy	0.23 (0.002)
Equally weighted initial return	0.22 ($<5E-06$)
Institutional investor dummy \times equally weighted average initial return	-0.24 (0.55)
Other firm dummy \times equally weighted average initial return	0.01 (0.93)
Ln (median order size)	0.11 ($<5E-06$)
Institutional investor dummy \times Ln (median order size)	-0.23 (0.41)
Other firm dummy \times Ln (median order size)	-0.03 ($<5E-06$)
<i>N</i>	10,870
Adjusted R^2	0.15

4. Discussion

4.1. Summary of empirical results

The results of this study show that the investment performance of the different investor categories displays little variance. Most notably, institutional investors do not on average realize larger percentage returns than their retail counterparts.

The principles for rationing oversubscribed shares favour small orders: allocation is a concave function of order size. Consequently, the first-day profits are modest for all investor categories: the median institutional investor realizes a FIM824 (US\$137) first-day profit per offer, for instance. Large investors could attempt to strategically anticipate rationing by placing large orders in attractive IPOs. By doing so, however, they increase the risk that they will face a winner's curse if the issue is overpriced (Koh and Walter, 1989; Keloharju, 1993; Lee *et al.*, 1999). The results of this paper also suggest that even institutional investors find it difficult to predict, at a sufficient accuracy, which IPOs truly are the attractive ones.

Investment performance is, however, positively associated with the coefficient of variation of order size, indicating that uninformed investors do vary their order size less than informed investors. This strategy is a rational response to the allocation rules because, as demonstrated earlier, it reduces the winner's curse.

4.2. Institutional investors' information advantage

Allocation rules favouring small orders make it difficult for institutional investors to utilise any information advantage, and, consequently, limit their incentive to acquire information and participate in the IPO market. Moreover, the option of circumventing the allocation rules by means of proxies favours retail investors. Institutional investors are unlikely to follow suit because they are very vulnerable to adverse publicity if they get caught.⁴

The findings that institutional investors achieve only modest performance and that information differences figure more importantly within rather than between categories cannot readily be generalised to markets where large orders are not discriminated against. In particular, the situation is different in markets using bookbuilding methods, where underwriters encourage investors to surrender accurate information by granting them above-normal allocations in hot issues. The results of Aggarwal *et al.* (2002), for example, show that institutional investors fare better than retail investors in a bookbuilding environment. A more generalisable interpretation of our results is that institutional investors are not *inherently* more informed than their retail counterparts: an institutional investor is unlikely to significantly outperform a retail investor if both put very little effort into information acquisition.

The distribution of information among investors may change if there is sufficient incentive to acquire information. Institutional investors probably have easier access to the relevant information (Zweig *et al.* (1994) suggest that retail investors are usually barred from 'road shows') and possess more analytical resources than retail investors. This relative advantage in information acquisition is likely to pay off when there is

⁴In one instance a firm attracted very bad publicity by collecting proxies from high school students. All the proxies were rejected (*Kauppaliehti* 5 May 1988, p. 17; *Kauppaliehti* 9 June 1988, p. 15).

greater incentive to make use of it. When the monetary incentive to acquire information is small—as it is in Finland—this relative advantage may be outweighed by retail investors' willingness to put more effort into information acquisition. Retail investors may view security analysis as a leisure activity (Lease *et al.*, 1974) and may not consider the effort involved as a significant investment.

4.3. Selection of preferred shareholder structure

The fact that the allocation mechanism discriminates against large orders also affects the post-IPO shareholder structure. Favouring small orders is likely to result in a fragmented shareholder base with many small investors. Should issuers and investment banks prefer a more diffuse or a more concentrated shareholder base?

Stoughton and Zechner (1998) and Mello and Parsons (1998) argue that the creation of larger shareholding blocks is preferable. The holder of a large block has a significant incentive to monitor the company. Active monitoring increases firm value by weakening agency problems between management and shareholders. This is beneficial also to the small, atomistic shareholders.

Brennan and Franks (1997) present a monitoring based argument that reaches a different conclusion. They argue that the incumbent management in fact prefers less monitoring, as this allows them to hold on to private benefits. The smaller the ownership blocks, the less incentive there is for outsiders to monitor the firm. According to Brennan and Franks, underpricing is deliberately used to ensure oversubscription and rationing of shares. This allows the issuer to discriminate between orders, and, in particular, to reduce the block size of individual new shareholdings.

An additional reason to prefer a diffuse shareholder base is discussed in Booth and Chua (1996). They argue that a diffuse shareholder base brings about greater liquidity and higher prices in the secondary market.

The issuer could prefer a diffuse shareholder base also because of product market concerns (Chaplinsky and Ramchand, 2000). Issuers with a large number of retail customers may wish to enhance name recognition and customer loyalty by making many of them investors in their company. Additionally, it has been argued that governments engaged in privatisation programmes have political reasons for preferring a large shareholder base (Jones *et al.*, 1999).

The investment bank may have shareholder structure considerations that differ from those of the issuer. Presumably, the investment banks wants to maintain good relationships with its major clients, which are the larger institutions. In a bookbuilding environment, this can be achieved by giving them large allocations in attractive IPOs. Benveniste and Spindt (1989) argue that institutional investors are rewarded through good allocations in exchange for providing valuable pricing information about the offer. Hanley and Wilhelm (1995) present empirical evidence in support of this. In a non-bookbuilding information such as this sample, however, there is no such valuable exchange of pre-pricing information. Accordingly, the institutional investors do not seem to get a reward from the investment bank.

There might be also other reasons for the banks to prefer larger clients. In particular, orders by institutional investors are larger on average, which may make this investor category a more efficient share distribution channel (Hanley and Wilhelm, 1995). In addition, the investment bank could attempt to maximize its

revenue by bundling brokerage or other services with above-normal allocations in hot issues (Smith, 1977; Schiffrin and Coleman, 1992; Zweig *et al.*, 1994).

4.4. Design of allocation rules

The results have important implications for the design of allocation rules, particularly in markets where the investment bank does not engage in information acquisition. The idea of an evenhanded allocation for all investor categories is not as fair as it appears if the rules favour small orders. This is because order size varies substantially across investor categories: the median institutional investor places orders approximately ten times as large as the median individual investor. Institutional investors therefore generally realize smaller percentage and possibly also absolute returns. In other words, allocation rules which favour small orders exacerbate the winner's curse for institutional investors which are less than perfectly informed and, consequently, discourage them from bidding.

There are two ways in which investment banks can remedy this situation. One method is to adopt allocation practices where the number of shares allotted is strictly proportional to order size. All other things being equal, this implies that allocation-adjusted percentage returns will be independent of order size: institutional and retail investors who are equally well informed will earn similar returns. The other remedy available to the investment banks is to stick to allocation rules that favour small orders but attempt to protect institutional investors from the winner's curse by allocating more shares to an institutional than a retail investor for a given order size. This protection is necessary because, at least under the circumstances described in this paper, an institutional investor is probably less informed than a retail investor if both place equally large orders. Therefore, allocation practices that apparently discriminate against retail investors—an issue that has been debated in the popular press (Schiffrin and Coleman, 1992; Zweig *et al.*, 1994)—might be explained by a desire on the part of investment banks to reduce the effects of the winner's curse for less-than-perfectly informed institutional investors.

How can institutional investors be expected to participate in a market where at best they can win a little and at worst they can lose a lot? They cannot. As a response to complaints from institutional investors, from late 1988 onward most major Finnish offers had a separate quota for large investors. The abolition of foreign ownership restrictions in Finland in 1993 gave rise to a new and increasingly sophisticated category of institutional investors. With the adoption of bookbuilding techniques and increased discretion in the design of allocation rules, the investment banks apparently learned to serve their institutional clients better. Since late 1994 almost all large Finnish IPOs have been priced using the bookbuilding method, and the bulk of the shares have been sold to institutional investors.

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