



American Finance Association

Bids and Allocations in European IPO Bookbuilding

Author(s): Tim Jenkinson and Howard Jones

Source: *The Journal of Finance*, Vol. 59, No. 5 (Oct., 2004), pp. 2309-2338

Published by: Blackwell Publishing for the American Finance Association

Stable URL: <http://www.jstor.org/stable/3694825>

Accessed: 23/11/2009 12:52

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/action/showPublisher?publisherCode=black>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



Blackwell Publishing and American Finance Association are collaborating with JSTOR to digitize, preserve and extend access to *The Journal of Finance*.

<http://www.jstor.org>

Bids and Allocations in European IPO Bookbuilding

TIM JENKINSON and HOWARD JONES*

ABSTRACT

This paper uses evidence from a data set of 27 European IPOs to analyze how investors bid and the factors that influence their allocations. We also make use of a unique ranking of investor quality, associated with the likelihood of flipping the IPO. We find that investors perceived to be long-term holders of the stock are consistently favored in allocation and in out-turn profits. In contrast to Cornelli and Goldreich (2001), we find little evidence that more informative bids receive larger allocations or higher profits. Our results cast doubt upon the extent of information production during the bookbuilding period.

DESPITE CONSIDERABLE RESEARCH on most aspects of initial public offerings (IPOs), there remains very little evidence on how the bidding and allocation process operates in practice in book-built offerings. There is a very good reason for this: the information that would be required—on the individual bids submitted by each investor, as well as the allocations of shares to investors—is proprietary information that investment banks are loathe to reveal. Indeed, recent investigations by the SEC and others into the allocation practices of certain investment banks have only served to enhance the sensitivity of this information. Yet without such details of the IPO process, it remains difficult to test, at least in a direct way, the theoretical explanations of phenomena such as the systematic underpricing of IPOs. Ritter and Welch (2002) conclude, in their survey of the theory and evidence on IPO activity, “research into share allocation issues is the most promising area of research in IPOs at the moment” (p. 1795). This paper contributes to this important research agenda.

The key distinguishing feature of IPOs conducted by bookbuilding, as opposed to auctions or public offers, is that the investment banks that underwrite the issue, and in particular the bookrunner, have discretion over who receives allocations. There are, broadly speaking, three views on how this discretion is exercised.

*Tim Jenkinson is at the Saïd Business School, Oxford University and CEPR. Howard Jones is at the Saïd Business School, Oxford University. For helpful comments and suggestions, we thank Reena Aggarwal, Jos van Bommel, Laura Field, David Goldreich, Rick Green, Alexander Ljungqvist, Jay Ritter, Ann Sherman, Bill Wilhelm, an anonymous referee, and seminar participants at the Georgetown University McDonough School of Business, City University Business School, Exeter University, Oxford University, the January 2003 American Finance Association conference, and the March 2003 NYSE/Stanford IPO conference. Any errors are our own.

First, allocations could be used to give investors incentives to truthfully reveal information that is valuable in pricing the issue. This was first discussed by Benveniste and Spindt (1989) and Benveniste and Wilhelm (1990). In these models, certain investors are endowed with information, and the investment bank uses its discretion over allocation to reward investors who reveal this information. Sherman (2000) and Sherman and Titman (2002) extend the framework to allow for costly information acquisition and suggest that it is the information acquisition constraint, rather than the truth-telling constraint, that determines pricing and allocation. However, it is worth noting that none of these models specify the precise form in which information is revealed to the underwriters.

The second view, which investment bankers tend to emphasize, is that allocations are directed toward investors who will be long-term holders of the stock, rather than “flippers.” Various justifications, both formal and informal, have been advanced for the preference for long-term holders. Most obviously, flippers will tend to depress the trading price in the immediate aftermarket. While this may be of little concern in hot IPOs—where such activity will increase market liquidity and generate trading commissions for the investment banks—in weak offerings there may be concerns that flipping could lower the trading price below the offer price. Zhang (2002) develops an alternative explanation for allocating stock to longer-term investors based on prospect theory. In Zhang’s model, the aftermarket price path depends on the initial allocations, with allocations to longer-term investors increasing equilibrium aftermarket demand. In the United States, the discouragement of flipping is backed up by the ability of the lead underwriter to track¹ the flipping activity of investors and to penalize syndicate members whose customers flip by withdrawing selling commissions. Such detailed tracking is not conducted in Europe.

The final view relates allocations to the generation of subsequent trading commissions. Loughran and Ritter (2003) present some general evidence in favor of this rent-seeking view. Although some specific examples of this linkage between allocations and commissions have been presented by prosecutors investigating the behavior of investment banks in the United States during the 1999–2000 IPO bubble period, systematic investor-level data linking allocations and trading commissions have proved elusive, with the exception of Reuter (2002) who finds support for a significant relationship in the case of mutual fund investors.

In this paper, we use a new data set comprising the complete books for 27 European IPOs to throw additional light on these views of how allocation is determined, although since we do not have information on subsequent trading commissions, our attention is focussed on the first two views. This information was provided by a leading European investment bank, which acted as

¹ This has been possible since the Depository Trust Company’s Initial Public Tracking System was implemented in 1997. For details on flipping activity and the use of penalty bids, see Aggarwal (2003).

the bookrunner on all the deals. We consider the impact on allocation of the nature of the bid (for instance, whether it is price sensitive) and the characteristics of the investors (for instance, whether they frequently submit bids to this particular investment bank). An important contribution of this paper is to introduce an independently produced ranking of investors that assesses the likelihood of flipping or being a long-term investor. This allows us to test, for the first time, whether long-term investors are favored in allocation. At a more informal level, we also provide some insights into various aspects of the IPO process.

This paper is closely related to that of Cornelli and Goldreich (2001), who analyzed similar data for 39 offerings (a mix of IPOs and seasoned offerings) led by a different European investment bank. They found results that were consistent with the information revelation view of allocation. Bids that were more informative—those that were price limited, submitted early, or revised during the bookbuilding—enjoyed preferential allocations (and higher out-turn profits). Our results are, in this respect, rather different. We not only find rather few informative bids, but also find little evidence that they receive favorable allocations or higher out-turn profits. Many of the other factors that influence allocation in our models are similar to those found by CG, particularly when we control for the high proportion of hot issues in our sample.

In the IPOs we designate as hot, we find less than 4% of bids are price limited. However, since the initial price range is revised far less frequently in Europe than in the United States (as noted by Ljungqvist, Jenkinson, and Wilhelm (2003)), if investors become aware that an IPO is heavily subscribed, the likelihood of the final price being set at the top of the initial price range reduces the incentive to place price limits on bids. Whatever the reasons for this inflexibility in the initial price range observed in European IPOs, the importance of information revelation during the bookbuilding period itself must surely be reduced as a result. However, this does not necessarily rule out information revelation *before* the bookbuilding phase, and being rewarded with the final allocation. Little research exists on the pre-bookbuilding phase of IPOs, although some recent papers have suggested that the differences across countries may be significant.² Therefore, while our results, which focus entirely on the bookbuilding period, certainly cast doubt on the generality of CG's findings and on the extent of information production during bookbuilding, it would be premature to reject the general class of information revelation theories.

Turning to the second view of allocation—that investment banks shun flippers and favor long-term investors—our data allow the first systematic analysis of this issue. We use a unique ranking of investors that assigns higher rankings to those investors perceived to be long-term holders of the stock. The rankings

² See, for example, Aussenegg, Pichler, and Stomper (2002), who find evidence that information was revealed prior to the bookbuilding phase for IPOs on the German Neuer Markt, but not on Nasdaq. Jenkinson, Morrison, and Wilhelm (2003) discuss why such pre-bookbuilding interactions may be more frequent and substantive in Europe than in the United States and show how the infrequent revision of initial price ranges may be linked to information exchange prior to the bookbuilding period.

are as near to being an objective measure of what investment banks (and the issuing company) typically consider the quality of bidders to be as it would be possible to find. We assign these rankings to the bidders for our IPOs and find consistently strong effects—in both hot IPOs and those with more normal levels of subscription—in favor of long-term investors. The preferential treatment of the highest quality investors is particularly strong in hot issues, and, since in our sample there is a positive correlation between over-subscription and initial underpricing, these investors enjoy significantly higher out-turn profits. These findings are certainly supportive of the view that IPO allocations are directed away from flippers and toward long-term investors.

Finally, we consider whether there is any evidence that IPO allocations are bundled across issues, with allocations of hot IPOs related to participation in the less highly subscribed issues. In terms of bidding behavior, we find no evidence that particular types of investor—such as high quality or high frequency—cherry-pick the hot issues. We also find that bidder frequency has little impact on out-turn bid profitability. Together, these findings are consistent with certain interpretations of the bundling hypothesis. However, we also investigate some alternative ways of testing for the existence of bundling, and we find no evidence that loyal investors (who participate in cold IPOs) are rewarded with superior allocations of hot IPOs. This suggests that bundling of hot and cold IPOs is, at the very least, incomplete.

The remainder of the paper is organized as follows. In Section I, we describe our sample, explain how the data have been organized, and compare our sample with that of CG. In Section II, we analyze the determinants of allocation for a variety of bid and investor characteristics and consider how the results differ in hot IPOs. In Section III, we extend the analysis to include quality rankings of investors. As these are not available for all investors in our sample, the results in this section are based on a subset of the bids. In Section IV, we consider the profitability of bids and whether IPOs are bundled to investors across hot and cold issues. Section V concludes.

I. Data

A. The Companies

In total, we have information on 27 bookbuilt IPOs. All the issuing companies are European, and the IPOs were conducted over the period 1996 to 2001. Their countries of incorporation are Belgium, France, Germany, Italy, Spain, and the United Kingdom. Around half are from the “old economy” and half from the “new economy.”³ Twelve of the 27 companies had venture capitalists as shareholders at IPO.

The size of the companies can be illustrated by a number of measures. The mean sales of the companies in the year preceding flotation was \$130 million,

³ Their industries are utilities, engineering, retail, food manufacturing, pharmaceuticals, insurance, media, waste treatment, apparel, furnishing, electronics, web hosting, and software.

with a range of \$2 million to just over \$850 million, while the total assets averaged \$167 million (range \$2 million to around \$1.5 billion) at the time of flotation. The mean (median) gross IPO proceeds were \$72 million (\$69 million), and the post-money market capitalization at the offer price averaged around \$230 million with a range of \$35 million to just under \$1 billion. Relative to the universe of European IPOs, our sample of companies is larger than average.⁴

B. The Offerings

Bookbuilding is used for institutional offerings that in our data set represent, on average, 84% of the total market offering (the rest being offerings to retail investors).⁵ In some cases, the institutional allocation accounts for the entire offering, while in only one transaction is it below 50%.⁶ On average, 60% of the offerings were primary equity (as opposed to sales by existing shareholders). All the offerings had a greenshoe (or over-allotment option) exercisable within 30 days of the start of trading of the new shares, which ranged in size between 10% and 15% of the institutional offering.

The width of the initial indicative price range shows a mean of 17% when calculated as a percentage of its mid-point. In examining the point within the range at which the final price was fixed, we take the lower bound of the range as zero and the top of the range as 100%. On this basis, the final price averaged 61%, with only one offering priced below and only one above the initial indicative range. Our small sample of IPOs appears, in these respects, to be rather similar to the universe of European IPOs: Jenkinson, Morrison, and Wilhelm (2003) find that the average width of the initial price range is 16.3% in Europe compared with 15.2% in the United States, and that only one-tenth of European IPOs are priced outside the initial price range, compared with around one-half of U.S. IPOs.

C. The Bids

In European IPOs, institutions have, as a rule, discretion as to the syndicate bank through which they place their bid.⁷ Each syndicate bank informs the bookrunner of the bids it has received, and the bookrunner builds a centralized book. Allocations are decided by the bookrunner and made via the syndicate bank through which the order was placed. That bank then earns the selling

⁴ Ljungqvist, Jenkinson, and Wilhelm (2003) report median gross proceeds of \$32 million for 1,441 European IPOs that took place over the period 1992 to 1999.

⁵ None of the offerings were hybrid transactions in which automatic clawback provisions affect the allocation between the institutional and retail offerings in the case of strong demand.

⁶ In some European markets, there is an obligation to include a retail offering in an IPO: in France, for example, a minimum of 10% of the offering must normally be set aside for retail.

⁷ It is quite common for investors to split their bids between syndicate members in European IPOs. This may be to produce an equitable split of selling commissions and/or to attempt to increase allocations. We show later that split bids do, on average, receive higher allocations.

concession (i.e., the portion of the commissions that rewards sales) on the allotted shares. In U.S. IPOs, on the other hand, all institutions place their bids directly with the bookrunner, regardless of which bank is responsible for the selling effort. The bookrunner then makes allocations directly to successful bidders, unmediated by syndicate banks. After the investors have received their allocations, they can designate the syndicate bank to which the selling concession is paid, so that banks other than the bookrunner can be rewarded.

It is debatable whether this difference between European and U.S. offerings would have any bearing on the analysis in the present paper as compared with a similar analysis of U.S. offerings.⁸ In this analysis, the European system assists us in a practical way, because it identifies the order-taking bank unequivocally, whereas in the U.S. system all orders are placed with the bookrunner and records of designated selling concession are kept separately, if at all. In any case, we have tested for the extent to which the bookrunner in our data set favors itself in allocations.

All the books we analyze have the same basic structure, having been produced using the standard bookbuilding software. If an investor submits multiple bids in a particular book, these bids are consolidated into a single entry that records the entire bid history of that investor. There is one exception to this rule on consolidation: we do not consolidate bids submitted to different members of the IPO syndicate, as we want to investigate whether allocations differ according to who took the order.⁹ This process of consolidation results in 5,540¹⁰ individual bids.

Bids can be made in a number of ways. In terms of amount, bids can be expressed as a number of shares or as a money amount subscribed. In terms of price, the two principal alternatives are strike bids, in which the bidder is prepared to accept whatever price is set for the shares, and limit bids, in which the bidder states a price above which she/he will not accept an allocation. Step bids are also allowed, in which a bidder divides the bid between a number of price limits so that, within these limits, demand rises or falls according to the final issue price.

At the end of the bookbuilding period, the bookrunner, in consultation or agreement with the company and its shareholders, fixes a final price, confirms the size of the offering on the basis of the bids received, and determines the allocations to each bidder.

⁸ Both systems give the bookrunner considerable power over the distribution of selling commissions. Although, at first glance, the U.S. system appears less open to the bookrunner favoring particular syndicate members (including itself), the repeated nature of the interaction between investors and investment banks is likely to result in strategic designation of selling commissions by investors to influence current—and future—allocations. This is equally the case under the European system.

⁹ However, when we categorize how frequently an investor has bid, we only count one bid per investor per IPO.

¹⁰ The original data set consists of 5,621 bids. We excluded bids that were cancelled (20); bids that were placed on behalf of syndicate members or friends and family of the issuing company (50); and allocations that were made where the original bid data were missing (11).

Table I
Investor Nationality and Bid Type

This table reports the distribution of bids according to the country of origin of the bidder. Limit bids and step bids are categorized as price sensitive. Currency bids specify a particular sum of money rather than a number of shares.

Country of Origin of Investor	Total Number of Bids	... of Which Are Price Sensitive (%)	... of Which Are Currency Bids (%)	% of Total Bids
Austria	64	1.6	7.8	1.2
Belgium	241	10.0	17.4	4.4
France	1033	8.4	58.8	18.7
Germany	1009	6.3	5.8	18.2
Italy	472	21.8	36.4	8.5
Luxembourg	210	8.6	13.3	3.8
Netherlands	85	5.9	24.7	1.5
Spain	272	1.5	86.0	4.9
Switzerland	795	3.5	24.8	14.4
United Kingdom	809	2.2	51.1	14.6
United States	51	0.0	51.0	0.9
Total of above	5036	7.0	35.9	90.9
Whole sample	5540	6.6	35.9	100.0

D. The Bidders

Bidders originated from 44 separate countries, although bids were heavily clustered in a few countries. In Table I, we list the distribution and type of bids for the top countries (by number of bidders). The relatively low incidence of bids from U.S. investors is explained by the fact that only eight of the IPOs had U.S. placements. In addition, many U.S. investors subscribe to European IPOs through their European offices. The proportion of price sensitive bids is surprising: only 6.6% of all bids specify any price limits. This is a considerably lower proportion than that found in the sample of offerings studied by CG; we discuss the differences in our samples in more detail below. It is also noticeable how the proportion of price sensitive bids varies considerably according to investor nationality. As we shall see later, this is related to the level of subscription of the IPOs in different countries, as price limits are seldom put on bids when the IPO is heavily subscribed, and there is a home country bias in bidding.¹¹

For each bid, we then allocated a code corresponding to a separate bidder. There are two ways of distinguishing between bidders. The first approach treats each bidder with a separate legal identity as distinct. On the other hand, two bidders with different legal identities may represent a single decision maker, in which case the legal entities are merely the portfolios into which the shares are

¹¹ In the sample as a whole, 39% of bids were submitted by investors with the same nationality as the issuing company. Hence, for example, Italian investors seem very keen on specifying limit prices for their bids, but the high proportion of price sensitive bids can be explained to a great extent by the existence of several poorly subscribed Italian IPOs in our sample.

placed after an investment decision has been made. So, XYZ Bank might bid for shares in the name of its European Fund and its Technology Fund, which are distinct legal entities, but the decision makers and the decision-making process might be identical for both. The bookrunner in the data set used in this paper adopted the second approach to distinguish between bidders when making allocations. Hence, we have coded bidders according to the decision maker, and on this basis, our sample includes 2,108 separate bidders.

In Panel A of Table II, we present evidence on how frequently the various decision makers bid. It is notable that around 58% of the bidders only participated in a single IPO run by this investment bank. On the other hand, there is a core set of around 200 investors who participated in six or more of the IPOs. We will consider in the econometric analysis whether those investors that frequently submit bids to this particular investment bank obtain better allocations. For this purpose, we define investors as being of medium- (high-) frequency if they bid in between three and five (six or more) of the offerings in our sample. Note that ideally we would like to know how frequently the investors had bid in offerings strictly *before* a particular IPO, but this information is not available. Therefore, we have to rely upon bid frequency within the sample of IPOs for which we have data.¹²

Most investment banks, when asked, will claim that they are influenced by the “quality” of the bidder, but in none of the books analyzed did the bookrunner attempt a systematic and objective ranking of bidders by their quality. When pressed to define a high-quality investor, many investment banks will relate quality to the probability of the investor being a longer-term holder of the stock. For example, Goldman Sachs placed the shares in its own IPO “with a group of institutional investors and rich individuals who Goldman believed would remain loyal, long-term holders and not flip the stock after its offering” (as reported by the *Wall Street Journal*, May 5, 1999). More generally, Aggarwal (2000) analyzes how investment banks closely monitor the trading activities of the investors to whom they allocate stock at the IPO and, in some circumstances, penalize flippers.

In this paper, we make use of a systematic ranking of over 4,000 institutions based on the likelihood of being a long-term investor. This was drawn up for a major European privatization IPO that took place during the sample period. The investment bank that acted as bookrunner for the offerings in our data set was also one of the bookrunners in this privatization and—along with the privatizing government, the privatized company and four other (European and U.S.) banks—was jointly responsible for assigning investor rankings. These quality rankings were drawn up under the definition of “investor quality” that was given to the banks in the syndicate in this privatization as part of the Rules of Engagement, as follows: “Quality of investor: investors who are likely to be long-term holders of the Shares will be treated more favorably.” These quality rankings were compiled in advance of this privatization by consensus between the five banks, government, and company. Potential bidders were given a

¹² There are no major differences in the bid frequencies based on investor nationality.

Table II
Bid Frequency by Investor

This table reports the distribution of investors according to the number of IPOs in which they participated. The number of bids column records the total number of bids made by an investor, and in some cases, a single investor will place more than one bid in a given IPO (as a result of splitting their order between different syndicate members). We define high- (medium-)frequency investors as those that bid in six or more (between three and five) IPOs. Not all investors in our sample have a quality ranking; Panel B relates only to ranked bidders.

Panel A: All Investors				
Number of IPOs in Which Investor Participated	Bidders		Bids	
	Number	%	Number	%
1	1230	58.3	1311	23.7
2	313	14.8	677	12.2
Total low frequency	1543	73.1	1988	35.9
3	168	8.0	549	9.9
4	105	5.0	486	8.8
5	90	4.3	517	9.3
Total medium frequency	363	17.3	1552	28.0
6	66	3.1	441	8.0
7	40	1.9	333	6.0
8	23	1.1	213	3.8
9	15	0.7	174	3.1
10	19	0.9	213	3.8
>10	39	1.9	626	11.3
Total high frequency	202	9.6	2000	36.1
Whole sample	2108	100.0	5540	100.0

Panel B: Ranked Investors					
	Low Frequency (%)	Medium Frequency (%)	High Frequency (%)	Total	
				% of All Ranked	Number
Rank 1 bidders	44.9	26.7	28.4	27.2	236
Bids	13.8	23.2	63.0	35.0	1183
Rank 2 bidders	54.7	28.9	16.4	29.5	256
Bids	21.5	33.9	44.6	27.8	941
Rank 3 bidders	60.0	25.1	14.9	20.2	175
Bids	26.7	34.0	39.3	16.6	562
Rank 4 bidders	54.9	31.0	14.2	13.0	113
Bids	20.8	35.7	43.5	12.5	423
Rank 5 bidders	60.2	28.4	11.4	10.1	88
Bids	26.6	34.7	38.7	8.1	273
Total ranked bidders	53.7	27.8	18.5		868
Total ranked bids	20.0	30.5	49.5		3382

ranking between 1 (best) and 5 (worst) with the instruction from the government in question that quality should be the only ranking criterion: origin, size, and any other factors were not to be considered. In drawing up these rankings, the five banks may of course have favored institutions close to them even if

they were not the most likely long-term holders. The extreme case would be hedge-funds, which are large clients of banks but are by nature not long-term holders, although these could be easily identified, and ranked accordingly, by the government. However, even other institutions that banks consider to be key clients may flip new issues and the government and company concerned would be unlikely to know this. Nonetheless, what we are interested in for our analysis is how our bookrunner allotted the institutions he thought were the highest quality, not whether his view of quality was unimpeachable.

In order to analyze the possible relationship between allocation and bidder quality in this paper, we have applied these rankings as far as possible to the bidders in the 27 offerings, which results in 3,382 bids from 868 separate bidders being ranked. Summary information on this subset of ranked bidders is presented in Panel B of Table II. The main difference between the sub-sample of ranked bidders and the total sample is that there are fewer investors in the ranked sample who are designated as low frequency (53.7%, compared with 73.1% in the full sample). This is unsurprising, as the occasional investor is less likely to have been included on the initial investor list that was ranked. Twenty-seven percent of the investors in our sample are designated the highest ranking, and it is noticeable that these investors are more likely to be bid frequently, as they submit 35% of the ranked bids. The proportion of investors in our sample falling into each quality ranking is roughly in line with the proportions in the overall ranking, with a slight over-representation of the top two rankings.¹³

E. Outcomes

The level of subscription varied considerably across the IPOs, ranging from 1.2 to 92 times the institutional allocation. Although there is no clear threshold beyond which an issue is unambiguously “hot,” we use a value of 10 times subscribed, which corresponds to the median level of subscription in our sample. We prefer this measure of hotness to an underpricing measure (i.e., immediate aftermarket performance), because over-subscription can be felt and therefore acted upon by bidders during the offering itself, sometimes with hints from the bookrunner, whereas the aftermarket performance is pure guesswork at that stage, other than through a thin and often unreliable “grey” market. However, as we report in Section IV, in our data set, the level of subscription is highly correlated with initial underpricing and, therefore, hotness can be taken to reflect both measures.

In order to measure the rationing of investors, we use the approach suggested by CG. For each IPO, individual bids are expressed as a proportion of total demand, and individual allocations are expressed as a proportion of the total offering.¹⁴ By normalizing in this way, the treatment of bidders can be viewed

¹³ In the overall ranking, the proportions for ranks 1 to 5 were 24%, 25%, 25%, 16%, and 10%, respectively.

¹⁴ Recall that the bookbuildings do not involve retail investors. Therefore, to calculate normalized rationing, we measure total *institutional* demand and the total *institutional* offering. We exclude any portion of the offering that is retained for discretionary distribution by the issuing company or the bookrunner.

on an equivalent basis between offerings and prevents the distortion that would otherwise arise from the different levels of subscription in offerings. Normalized rationing is defined as the ratio of the percentage allocation to the percentage bid. If the investment bank allocates on a strictly pro rata basis, all bids would have normalized rationing of 100%. When normalized rationing is greater than (less than) 100%, a bid has received a more than (less than) pro rata allocation. We exclude from the analysis all investors who initially bid but then cancelled their bid before the end of the bookbuilding period.

In Table III, we present summary statistics for the bids, allocations, and normalized rationing according to various criteria. In Panel A, we report the average normalized rationing according to the size quartile of the bid (relative to all other bids submitted for that IPO). As can be seen, there is clear evidence that larger bids receive larger pro rata allocations. We then split the sample according to the frequency with which the bidder participated in this sample of IPOs. The more frequent bidders tend, on average, to submit larger bids, and are less rationed. We then split the sample according to whether or not the submitted bids were price sensitive. On average, price sensitive bids are less rationed than strike bids, although the former clearly have a much larger average size than the latter, and may be favored on that basis, rather than as a result of their price sensitivity. Disentangling the impact of these various influences requires a regression analysis, which we perform in the next section.

Next, in Panel B, we consider how bidding and normalized rationing differ in hot issues. In terms of the distribution of bids between hot and normal offerings, the proportion of bids submitted by high-, medium-, and low-frequency bidders is rather similar. In particular, there is no evidence, on average, that high-frequency bidders “cherry-pick” the hot issues; indeed, the proportion of bids submitted by high-frequency investors is actually higher for the non-hot issues.

There is, however, a significant difference in the types of bid submitted according to whether or not the IPO was hot: 3.4% of all the bids submitted during hot IPOs were price sensitive compared with 18% of the bids in the other IPOs. Of course, as noted above, a strike bid is essentially equivalent to a limit bid at the top of the price range, and given that hot issues are precisely those where the final price is likely to be at the top of the range, there may be less significance in the different types of bid than in the reasons why the price range in such issues is not revised upwards.

We also report in Panel B the normalized rationing of bids across hot and non-hot issues according to investor bidding frequency. The pattern of investors being less rationed if they bid more frequently, previously reported in terms of the whole sample, carries over to both the hot issues and the remaining issues. However, we are also interested in any differences in the pattern of normalized rationing between hot and cooler IPOs. A simple way to measure this is to consider the difference of the average normalized rationing by investor category, which we report in the final column. This summary evidence suggests that while high-frequency investors generally get preferential allocation, this is more pronounced in hot issues. We consider this issue more fully in Section IV when we analyze the factors that determine the profits earned by investors.

Table III
Bids and Allocations

Panel A records the average size of the bids, their average allocation, and normalized rationing for various sub-sets of the data. The total number of bids for which we have normalized rationing data are 5,510, as 30 of the limit price bids were below the final strike price, and so the conditional demand was zero. Normalized rationing is defined as the ratio of percent allotted to percent bid. High- (medium-) frequency bidders participated in six or more (between three and five) IPOs. Limit bids and step bids are categorized as price sensitive; currency bids are included with strike bids. Panel B reports the proportion of bids submitted, whether they were price sensitive, and average normalized rationing (across both price sensitive and strike bids), according to the frequency of bidder and whether the issues were hot (at least 10× subscribed) or not. Panel C presents the same information, but for the subset of bids (3,357) submitted by bidders who were allocated a quality ranking.

Panel A: Normalized Rationing According to Bid Characteristics									
	Bid Size Quartiles				Bidder Frequency			Type of Bid	
	Smallest	2	3	Largest	High	Medium	Low	Price Sensitive	Strike Bids
% Bid	0.037%	0.14%	0.35%	1.41%	0.63%	0.47%	0.33%	1.22%	0.43%
% Allocated	0.027%	0.12%	0.35%	1.40%	0.72%	0.40%	0.25%	1.14%	0.42%
Normalized	53.0%	64.9%	85.7%	111.7%	109.5%	71.6%	51.7%	93.9%	77.1%
rationing									
Number of bids	1378	1377	1377	1378	1989	1544	1977	334	5176

	Hot Issues			Non-Hot Issues			Difference
	Proportion of Bids (%)	Price Sensitive (%)	Normalized Rationing (%)	Proportion of Bids (%)	Price Sensitive (%)	Normalized Rationing (%)	Rationing
							Hot vs. Other (%)
Panel B: Normalized Rationing in Hot vs. Normal Issues							
High frequency	35.2	2.4	112.4	39.4	15.1	99.9	+12.5
Medium frequency	28.7	3.3	67.1	25.5	21.7	90.6	-23.5
Low frequency	36.1	4.6	46.2	35.1	18.6	72.8	-26.6
All bids	100.0	3.4	75.5	100.0	18.0	88.1	-12.6
Panel C: Normalized Rationing According to Quality Rankings							
Quality 1	35.5	4.1	144.4	33.2	19.7	111.8	+32.6
Quality 2	28.3	3.0	76.1	26.2	15.3	88.2	-12.1
Quality 3	16.5	2.1	54.7	17.1	11.7	82.6	-27.9
Quality 4	12.2	2.2	43.6	13.6	21.6	78.2	-34.6
Quality 5	7.5	2.5	52.8	9.9	10.8	68.8	-16.0
All quality-ranked bids	100.0	3.1	91.0	100.0	16.6	91.7	-0.7

Finally, in Panel C, we repeat the analysis of Panel B but for the subset of investors who have a quality ranking in our sample. We find little evidence that bidding behavior differs across hot and cooler issues, but we do find significant differences in allocation. In particular, there is a clear pattern with allocation decreasing systematically as investor quality rankings fall (with the exception of the quality 5 investors in hot issues). While there clearly could be many other factors that could explain allocation, these descriptive statistics give a strong indication that the ranking of investor quality seems to influence allocation decisions.

*F. Comparison with the CG Sample*¹⁵

The data used in this paper, as well as those analyzed by CG, were supplied on the basis that information on the specific offerings would not be revealed. However, without breaching confidentiality, we are able to identify a number of dimensions upon which our samples differ.

First, although both bookrunners are among the top European investment banks, the CG bookrunner is ranked more highly (in terms of the quality and quantity of deals) by both practitioner and academic rankings. For instance, the rankings produced by Jay Ritter¹⁶ for the period 1992 through 2000 suggest that the investment bank used in this paper is ranked 7–8 in comparison with the 8–9 ranking for the CG bank. These rankings have a U.S. focus in their construction, and consistent with this, there is a noticeable difference in the nationality of the investors between our samples. In the CG sample, all the offerings had U.S. bidders, whereas only eight of the offerings in our sample had U.S. tranches. Consequently, whereas only 1% of all bids in our sample came from U.S. investors, they supplied around 13% of the bids for the IPOs in the CG sample.

Second, it is possible that the types of bids submitted could vary along national lines. It is interesting to note, however, that the U.S. IPO bidders in the CG sample submitted somewhat fewer price contingent bids (11%) than the average for all investors (20%), so it is not simply the case that the more numerous U.S. investors in the CG sample drive the differences. The main difference in bidding behavior, we would argue, relates to the level of subscription of the IPOs. Our sample is considerably “hotter” than CG’s: only 6 of their 39 offerings were more than 10 times subscribed, in contrast to 14 of our 27 IPOs. Indeed, our “non-hot” IPOs are rather similar, in terms of their average level of subscription, to the entire CG sample. When these samples are compared, the proportion of price sensitive bids is rather similar: 18% in our non-hot IPOs, compared with 20% in the CG sample. In much of the econometric analysis, we therefore estimate models separately for the hot and cooler issues.

Third, there are some differences in the types of offerings included in our samples. This paper considers only private sector IPOs, whereas 23 IPOs and

¹⁵ We thank David Goldreich for the very helpful information he has provided.

¹⁶ Available at <http://bear.cba.ufl.edu/ritter/Rank.HTM>.

16 seasoned offerings comprise the CG sample, and 14 of all their issues were privatizations. It seems plausible that seasoned offerings and privatizations may involve different incentives for investors to submit price sensitive bids than private sector IPOs.¹⁷ On the other hand, CG present evidence that the differences in allocation between seasoned offerings and IPOs, and between privatizations and private sector IPOs, are few for their sample. There is also a difference in our samples of companies: the CG sample consists almost entirely of “old economy” companies, whereas our (somewhat more recent) sample is split about evenly between old and new economy companies. Both the factors, therefore, point toward higher valuation uncertainty in our sample.

In summary, although we cannot absolutely rule out all manner of potential differences in our samples, the most important distinction, we would argue, relates to the level of subscription. In the next two sections, we perform an econometric analysis to disentangle the various influences on allocation. In Section II, we start by ignoring the quality rankings, then continue in Section III with an analysis based on the sub-sample of our bidders for whom we have quality rankings.

II. What Factors Determine Allocation?

We have identified a number of factors that may influence allocations to investors. Bids that include price limits give more information than an equivalent-sized strike bid. Similarly, a bid submitted early in the bookbuilding would generally be more valuable, as it may inform a revision to the price range. Such revisions are more costly to make later in the bookbuilding as they require an addendum to the prospectus to be published, which can take some days and can delay the IPO. It might also be conjectured that when bids are revised—either in terms of their quantity and/or price—they convey information additional to those that are not revised during the bookbuilding. On the other hand, reduced bids (reductions in the price and/or quantity bid) might produce different responses from the bookrunner than increased bids.

There are various other characteristics of the bid that may influence allocation. We have seen evidence in Table III that larger bids tend to get higher pro rata allocations. The economic reasons for this might be to concentrate control in the hands of a smaller number of large shareholders or, somewhat less benignly, the greater bargaining power of larger institutional investors. Allocation decisions might also be influenced by whether the bid was submitted directly to the bookrunner (rather than another syndicate member). The bookrunner retains wide discretion over final allocation, fettered only by the right of the issuing company to influence the allocation (which in practice is rarely exercised, and only then to a limited extent). In order to maximize its share of

¹⁷ For example, in some early U.K. privatizations, the government explicitly stated which types of bids should be favored by the bookrunner. Early and limit bids were generally favored. It is very rare for a private sector company conducting an IPO to either stipulate such rules or to influence the bookrunner in this way.

the selling commissions, the bookrunner should favor those bids submitted directly to it over those submitted to other syndicate members. However, faced with these incentives, investors may choose to split their bids between multiple syndicate members in an attempt to engineer an equitable distribution of selling commissions—in favor of those syndicate members who have marketed the IPO to the particular investor—or to maintain more general relationships with the designated investment bank. This splitting of bids between syndicate members occurred in 10% of the bids in our sample.

Allocation may also be influenced by characteristics of the bidder. In particular, those investors who submit bids more frequently to a particular investment bank might receive preferential allocations. We also investigate whether the nationality of the bidder—in particular, whether the investor is of the same nationality as the issuing company—influences allocation decisions. We leave consideration of whether allocations are directed away from flippers and toward those investors perceived to be longer-term holders of the stock until the next section.

A. Replication of the CG Empirical Model

We start our analysis by replicating, as far as possible, the model estimated by CG.¹⁸ In the first three columns of Table IV, we regress normalized rationing against dummy variables that pick up the various bid and bidder characteristics we have identified using the whole sample of IPOs, and also estimate separate regression for the hot and non-hot issues.¹⁹ Of course, the discretion afforded the bookrunner over allocation will be greater in more heavily subscribed IPOs. As our full sample includes more hot issues, the most direct comparisons with CG can probably be made with our non-hot issue sample.

Considering first the impact of bid size on allocation, we find that larger bids receive higher pro rata allocations. In the whole sample, the largest (top quartile) bids receive 20% higher allocations than the large (2nd quartile) bids, which in turn receive 20% higher allocations than the remaining smaller bids. This preferential allocation is slightly more pronounced in the hot issues and less pronounced (but still significant) in the non-hot issues. These results are broadly consistent with those found by CG.

Next, we consider the effect of submitting different types of bid. Although the estimated coefficients associated with submitting price-sensitive bids or currency bids are positive, they are not statistically significant.²⁰ This finding is consistent throughout all the models estimated in this paper and casts doubt on the generality of CG's results as well as on whether incentivizing information revelation during bookbuilding is a critical determinant of allocation in IPOs.

¹⁸ See Table IV Regression 2 in CG (2001, p. 2352). Given that we have different numbers of offerings in our samples, our definitions of high frequency and medium frequency bidders are inevitably slightly different.

¹⁹ We also include fixed effects for each IPO to capture any idiosyncratic influences on allocation that we have not included in the regressions.

²⁰ This lack of significance also holds if limit bids and step bids are controlled for separately.

Table IV
The Determinants of Allocation

The dependent variable is normalized rationing (the ratio of % allotted to % bid). Investors are classified as largest if the size of their bids was in the top quartile of bids by size for that IPO (large refers to the second quartile). Limit bids and step bids are categorized as price sensitive. Currency bids specify a particular sum of money rather than a number of shares. Early bids are the first 25% of bids submitted for each IPO. Bids where the price and/or quantity was changed during the bookbuilding are classified as revised bids. High- (medium-) frequency bidders participated in six or more (between three and five) IPOs. Investors are designated "home" investors when they are of the same nationality as the issuing company. Issues are defined as hot if they were more than 10× subscribed. Limit bids (30) that fell below the final strike price are excluded. All regressions include fixed effects for each IPO. *T*-statistics (based upon robust standard errors) are in parentheses.

	1	2	3	4	5	6
	All IPOs	Hot IPOs	Non-Hot IPOs	All IPOs	Hot IPOs	Non-Hot IPOs
Bid Characteristics						
Largest bids	0.40 (8.4)	0.45 (7.5)	0.16 (3.6)	0.39 (8.2)	0.44 (7.4)	0.15 (3.4)
Large bids	0.20 (4.0)	0.22 (3.3)	0.14 (3.4)	0.20 (3.9)	0.21 (3.2)	0.13 (3.3)
Price sensitive	0.15 (1.2)	0.09 (0.4)	0.04 (0.9)	0.15 (1.1)	0.12 (0.4)	0.02 (0.5)
Currency bids	0.06 (1.3)	0.07 (1.3)	0.06 (1.5)	0.06 (1.3)	0.08 (1.3)	0.07 (1.7)
Early bids	-0.02 (0.4)	0.02 (0.2)	-0.09 (2.1)	-0.04 (0.6)	-0.01 (0.1)	-0.09 (2.2)
Revised bids	-0.12 (2.5)	-0.14 (2.5)	-0.04 (0.9)			
Submitted to bookrunner	0.55 (13.5)	0.68 (12.8)	0.25 (7.0)			
Quantity increased				-0.11 (2.2)	-0.11 (1.9)	-0.08 (1.3)
Quantity decreased				-0.26 (2.8)	-0.36 (2.9)	-0.12 (1.5)
Price revised				0.04 (0.2)	-0.23 (0.9)	0.16 (1.9)
Single bid via bookrunner				0.57 (13.4)	0.71 (12.8)	0.26 (7.2)
Split bid via bookrunner				0.75 (7.4)	0.85 (7.6)	0.60 (2.5)
Split bid not via bookrunner				0.17 (2.7)	0.22 (2.9)	0.18 (2.3)
Bidder Characteristics						
High frequency	0.34 (5.9)	0.37 (5.2)	0.18 (3.8)	0.31 (5.3)	0.35 (4.7)	0.16 (3.6)
Medium frequency	0.05 (0.9)	0.03 (0.1)	0.11 (2.7)	0.04 (0.6)	0.01 (0.1)	0.10 (2.5)
Home investors	-0.01 (0.3)	-0.04 (0.7)	0.16 (4.0)	-0.02 (0.5)	-0.05 (0.9)	0.15 (3.9)
<i>R</i> ²	7.4%	7.7%	16.9%	7.5%	7.8%	18.1%
Number of bids	5510	4335	1175	5510	4335	1175
Number of IPOs	27	14	13	27	14	13

Turning to the timing of bids, we find some limited evidence, outside the hot issues, that bids submitted early in the bookbuilding period receive worse allocation, although the estimated coefficient is both small and only marginally significant. This result is in line with CG and is difficult to rationalize in terms of information revelation theories. However, we show later that this effect disappears when we introduce our long-term investor ranking.

Revising a bid during the bookbuilding period tends to have a significant negative effect on allocation. In this regard, our results are the opposite of CG, although in neither case is the quantitative effect very large. However, recall that the revision dummy picks up either quantity or price revisions in either direction. It seems likely that there may be differential responses on the part of the bookrunner to different types of revision. For example, it seems quite plausible that the bookrunner would seek to dissuade investors from inflating their bids in hot IPOs by giving smaller pro rata allocations to bids where the quantity was revised upwards during the bookbuilding. We explore such issues further below.

The final bid characteristic that we include is a dummy picking up whether the bid was submitted to the bookrunner (or, where there were joint bookrunners, to either) or to another syndicate member. In the sample as a whole, 74% of bids were submitted to the bookrunner(s), and pro rata allocations for such bids are 55% higher. It is noticeable that this preferred allocation is considerably higher in the more heavily subscribed issues, which suggests that investment banks use the increased discretion they enjoy in hot issues to appropriate a greater share of the selling concessions. CG find a similar result.

Turning to the bidder characteristics, in the full sample, we find significantly higher allocations—around one-third higher—to high-frequency investors, but no significant effect for medium-frequency investors. However, we find a significant positive impact of being a medium-frequency investor outside the hot issues, where our results are again similar to CG.

Finally, we consider whether those investors whose nationality is the same as the issuing company obtain preferential allocation. We find that such “home” investors²¹ get significantly higher allocations of the less hot issues only. This is consistent with casual reports we have heard suggesting that in the case of colder IPOs investment banks allocate more of the issue to domestic investors.²² CG also find a positive, but somewhat smaller, effect.

In summary, in many respects, our results are very similar to those found by CG, in particular when we exclude hot issues from our sample. Both papers find

²¹ In the sample as a whole, 39% of bids were submitted by home investors. In all IPOs except one, the company was incorporated in the country where it chose to list. In the remaining case, the company chose to list on a “foreign” exchange, but this in no way limited the participation of home investors, who submitted 41% of the bids.

²² We have heard various justifications for concentrating colder issues on domestic investors, including the claim that investment banks have more leverage over home investors than foreign (especially large U.S.) investors. This leverage may derive from market power of the investors. Alternatively, it may be that domestic investors—many of whom manage portfolios focused on their home market—are likely to have less elastic demand for domestic IPOs than foreign investors managing international portfolios.

that allocations are related to the size of the bid, whether it was submitted to the bookrunner, whether bids came from home investors, and the frequency with which a bidder participates in the IPOs of the particular investment bank. This tends to add credence to our claim that the most important difference between our samples is likely to be the level of subscription, rather than the fact that CG include secondary offerings and privatizations or some other difference. However, in one respect our results are noticeably at variance: we find virtually no evidence that more informative bids—those that are price sensitive, early, or revised—are favored. Our results, therefore, cast some doubt on the information revelation view of bookbuilding.

B. Extensions and Robustness Checks

In models 4–6 of Table IV, we explore further two issues not considered by CG: the impact of submitting bids (for a given IPO) to multiple syndicate members and the impact of different types of bid revision on allocation. We also report some robustness checks regarding our definition of investor frequency.

Considering multiple bids first, we identify separately whether the bid was split between syndicate members and whether the bid was submitted to the bookrunner.²³ The results of models 1–3 show a strong positive impact of submitting a bid via the bookrunner, but models 4–6 show that splitting bids between syndicate members also increases allocation. So, for example, a bid that is split between the bookrunner and another syndicate member (who is not a joint bookrunner) will receive, on average, an extra 75% allocation on the portion submitted to the bookrunner and an extra 17% allocation on the portion submitted to the other syndicate member (in the empirical model, the baseline is a single bid not submitted to the bookrunner). This suggests that the practice of splitting bids, which in theory seems irrelevant, does strongly affect allocation decisions. Since virtually all split bids include a portion submitted to the bookrunner, this seems to support the idea, mentioned above, that investors are attempting both to increase the chance of allotment and ensure an equitable distribution of selling commissions to the syndicate members who had exerted selling efforts.

Models 4–6 also include a more detailed analysis of bid revisions, which are decomposed into increased quantity, decreased quantity, and price revisions.²⁴ Seven hundred and fourteen bids (13% of the total sample) were revised during the bookbuilding: 621 had their quantity revised upwards, 78 had quantity revised downwards, and 46 had the price changed (31 had both quantity and price revisions). We find that only quantity revisions significantly affect allocation.

²³ Recall, as explained in the previous section, that we do not consolidate bids submitted by a given investor to different syndicate members. Across the whole sample, 10% of the bids were split between syndicate members. Of these bids, 58% were submitted to a bookrunner and 42% to other syndicate members. This reflects the fact that, in the case of joint bookrunners, it is quite common for investors to submit a bid to each bookrunner.

²⁴ Given the small number of price revisions, we do not separately analyze upward and downward revisions. Furthermore, almost all price revisions in our sample were upwards.

The evidence suggests that bookrunners tend to reduce the pro rata allocations of those investors who reduce their bid during the bookbuilding. While this may have some intuitive appeal—in terms of punishing fickle investors—it is more difficult to reconcile with information revelation theories. We also find somewhat weaker evidence that bids where the quantity is revised upwards suffer lower allocations. This may seem to be a strange result; however, the effect is more significant in the hot IPOs, in which the bookrunner may be concerned not to encourage inflating of demand.

Finally, we investigated the robustness of our results to alternative definitions of investor frequency. If we increase the number of IPO participations required to be classified as a high-frequency investor, then the estimated effect on allocation (taking model 4 of Table IV as the baseline) is to increase the preferential allocation to high-frequency investors only marginally to 37% (for at least 7 IPOs) and to 40% (for at least 8 IPOs).

However, it could be argued that if investors bid more frequently for IPOs from their home country, which is likely given the incomplete nature of European market integration, then our measure of frequency—which is based upon participation across the whole sample—may be less than ideal. For example, an investor, who only bids for home IPOs, from a country with few IPOs in our sample, may bid for them all and still be classed as low frequency. Clearly, this problem derives in the main from the relatively small number of IPOs in our sample; nevertheless, in order to test the robustness of the result that higher-frequency investors receive preferential allocations, we experiment with an alternative definition of bidder frequency, which takes account of possible national biases in bidding.

Of the 27 IPOs, the two most frequently represented countries contribute eight each. If we limit our attention to these two countries, then it is possible to redefine high-frequency investors as being those who participated in a certain number (at least four in our empirical model) of IPOs from their home country. While this inevitably results in a smaller data set, it provides an alternative definition of investor frequency that is not subject to concerns regarding the segmentation of markets. When we re-ran the regression in column 4 of Table IV on the IPOs from these two countries, using the alternative definition of bidder frequency, we continued to find that high-frequency investors received significantly higher allocations (23% higher).

Hence, our results relating to bidder frequency are not particularly sensitive to our chosen definition. In the next section, we extend the analysis to consider the impact of investor quality on allocation decisions.

III. Do High Quality Investors Get Better Allocations?

Although the allocation process is invariably shrouded in mystery, many investment bankers claim to allocate IPOs in favor of long-term investors. In this section, we make use of our investor ranking, whose single criterion is whether they are likely to be longer-term investors, to see if this factor indeed has an

impact on allocation. As explained in Section I, these rankings are only available for 3,382 of the bids in our sample.

We present the results in Table V, where we supplement the previous models with our quality rankings. We find that being a quality 1 (highest quality) bidder significantly increases allocation, with smaller and less significant effects found for the other quality levels. For example, in the whole sample estimates, a bid by a quality 1 investor received, on average, a 45% higher pro rata allocation than a similar bid from a quality 2 investor, and nearly 70% more than a quality 5 (lowest quality) investor. These effects are generally quite similar in the hot and non-hot IPO samples, except in the case of the highest quality investors, where the impact on allocation is twice as large in the hot issues compared with the remaining IPOs. Given that the level of subscription and initial underpricing are correlated in our sample, this pattern of allocation implies that those viewed as long-term investors enjoyed considerably higher out-turn profits. We explore this further in the next section.

It might be expected that the quality rankings would be correlated to some extent with other variables that are included in the model, in particular bid size and bidder frequency. In absolute terms, there is certainly a clear relationship between bid size and our quality ranking: the average bid by quality 1 investors is for around \$5 million of stock, falling to around \$4.3 million for quality 2 investors, with quality 3, 4, and 5 investors having similar average bids of around \$2 million. However, these simple averages do not measure the relative size of bids for a particular IPO, which is the definition of size we include in our empirical model. For the sub-sample of investors that have quality rankings, 42% of bids from quality 1 investors are in the largest quartile, falling to 26% for quality 2 investors, and under 20% for the lower quality bidders. There is no significant difference in the proportion of 2nd quartile bids submitted according to investor quality.

Similarly, as was noted in our discussion of Table II, there is some correlation between quality ranking and bidder frequency. In particular, quality 1 ranked investors tend to bid more frequently: 63% of bids from quality 1 investors are also designated as high frequency, whereas for all other quality rankings the proportion falls within the range 39–45%. There is no significant correlation between the quality rankings and the medium-frequency variable.

Given these correlations, it would be expected that certain of the coefficient estimates would differ when quality rankings are included, and this is what we find. The estimated effect of being a high-frequency investor is reduced in both size and significance when the investor quality variable is introduced. Larger bids continue to enjoy less rationing, but the estimated effect is again somewhat smaller. For all the other variables included in the model, there is little correlation with the quality rankings. We continue to find that submitting price sensitive, currency, or early bids has no significant impact on allocation. Submitting bids via the bookrunner and splitting bids continue to result in higher allocations.

The evidence from the regression analysis, therefore, strongly confirms that the quality rankings are contributing significant incremental explanatory

Table V
The Determinants of Allocation, Including Quality Rankings

The dependent variable is normalized rationing. These regressions use only those bids where the bidder has a quality ranking. In total, 3,382 bids have quality rankings. Limit bids (25) that fell below the final strike price are excluded. The quality rankings range from 1 (highest quality) to 5 (lowest quality). See Table IV for other data definitions.

	1 Whole Sample	2 Hot IPOs	3 Non-Hot IPOs
Bid Characteristics			
Largest bids	0.28 (4.6)	0.31 (3.9)	0.08 (1.3)
Large bids	0.14 (2.2)	0.15 (1.9)	0.06 (1.2)
Price sensitive	0.11 (1.0)	0.06 (0.3)	0.04 (0.6)
Currency bids	0.07 (1.3)	0.07 (1.1)	0.09 (1.7)
Early bids	0.01 (0.2)	0.04 (0.3)	-0.02 (0.4)
Quantity increased	-0.11 (1.6)	-0.10 (1.4)	-0.10 (1.5)
Quantity reduced	-0.34 (2.8)	-0.49 (3.1)	-0.20 (1.6)
Price revised	-0.01 (0.1)	-0.30 (1.1)	0.25 (2.9)
Single bid via bookrunner	0.58 (11.3)	0.72 (10.0)	0.30 (7.0)
Split bid via bookrunner	0.72 (6.2)	0.83 (6.3)	0.47 (2.2)
Split bid not via bookrunner	0.07 (0.9)	0.09 (1.1)	0.25 (2.3)
Bidder Characteristics			
High frequency	0.25 (3.4)	0.31 (3.4)	0.03 (0.6)
Medium frequency	0.04 (0.5)	0.04 (0.4)	0.03 (0.5)
Home investors	-0.11 (2.3)	-0.17 (2.7)	0.12 (2.9)
Quality 1	0.69 (6.8)	0.78 (5.9)	0.39 (5.7)
Quality 2	0.24 (2.4)	0.26 (2.0)	0.21 (3.2)
Quality 3	0.08 (0.7)	0.07 (0.5)	0.14 (1.9)
Quality 4	0.01 (0.1)	-0.00 (0.0)	0.09 (1.0)
R^2	11.7%	12.6%	22.2%
Number of bids	3357	2623	734
Number of IPOs	27	14	13

power to the model. This is reflected in the impact on the R^2 : if the quality ranking are excluded (for the sample of firms with such rankings) R^2 falls from 11.7% to 8.6%.

In columns 2 and 3 of Table V, we investigate how the results differ according to the level of subscription. In general, the pattern of results is very similar to that found in the earlier analysis presented in Table IV. The absolute size of most of the estimated coefficients is again higher for the hot issues, reflecting the greater discretion available to the bookrunner. The results when we control for investor quality strengthen those previously reported in Table IV: in hot issues, home investors get significantly lower allocations, and in non-hot issues they receive significantly higher allocations.

For the less well-subscribed IPOs, the introduction of the quality rankings reduces the significance of many of the variables, and we find that there are few additional factors—other than to whom the bid is submitted, and whether the bidder is a home investor—that influence allocation in a significant way. This suggests that in less well-subscribed IPOs, the bookrunner is particularly concerned about possible downward pressure on price in the aftermarket, and consequently focuses any discretion over allocation in favor of those viewed as longer-term investors.

In summary, we find very strong support, in both hot and less heavily subscribed IPOs, for the view that IPO allocations are directed toward those investors perceived as long-term investors and away from flippers.

IV. Do Certain Investors Earn Higher Profits?

Up to this point, we have focused entirely on allocation decisions. It is also interesting to investigate the ultimate profitability of the bids submitted. Profits clearly depend upon the out-turn market price of the IPO. While investment banks do not know at the time they allot an issue the price at which it will initially trade, there is a strong relationship between the latter and the over-subscription observed in the book. In our sample, the median underpricing of hot issues (as measured by demand during the bookbuilding) is 32% in contrast to 0% for the remaining issues. In this section, we investigate whether the out-turn profitability of bids is systematically related to characteristics of the bid and the bidder.

How to measure the profitability of bids warrants some discussion. For each bid, we know the dollar value of the bid (at the issue price) and the dollar value of the allotted shares. We compute the initial return by comparing the price after five trading days to the issue price, after allowing for movements in the local market index. By multiplying the initial return by the amount allotted, we can compute the profit or loss in dollars associated with each bid. Across the 27 IPOs, \$365 million was “left on the table” according to this measure, amounting to an average of \$66,000 per bid. The question then arises as to how to turn these dollar profits (and losses) into rates of return, which can be more meaningfully compared across bidders.

One option is to express the profit/loss relative to the amount bid. The main argument for normalizing in this way is that the amount bid represents the capital committed, even if the amount allotted is substantially less (or in many cases zero). This is the way CG define their profitability variable. The average bid in our sample is for around \$3.3 million of stock, which results in an average bid profitability (measured relative to amount bid) of just over 1%. However, while the amount bid may be the theoretical maximum amount of capital committed, in practice, given the over-subscription of IPOs, the effective commitment of capital is in expectation much less. For example, during hot IPOs, it seems quite likely that investors will systematically inflate their bids in the expectation that amounts allotted will be a small fraction of the amount bid. According to this line of reasoning, the profits earned should be expressed relative to the expected capital commitment, which itself would depend on the expected level of over-subscription during the bookbuilding and past experience of other IPOs. However, while in principle the case for measuring profits relative to expected capital committed is strong, it is clearly not straightforward to measure these expectations in practice, and so we define profits relative to amount bid.

A. Determinants of Bid Profitability

We present various models investigating the factors that determine bid profitability in Table VI. Models 1 and 2 are similar to the earlier models explaining allocation, but now the dependent variable is bid profitability (we have excluded some explanatory variables included in Tables IV and V that were found to be insignificant). Note that fixed effects for each IPO are not included, as we are interested in the extent to which profits differ across issues.

Model 1 is estimated on the full sample of bids, and excludes quality rankings. In many respects, the findings mimic those previously reported in earlier tables, regarding the determinants of allocation. We find that the largest quartile of bids is more profitable, with a profit rate 0.74% higher than the remaining, smaller bids. Bids that are split between syndicate members and, in particular, those that are submitted via the bookrunner are also more profitable. Most profitable are single bids via the bookrunner, which are associated, on average, with a profit rate 1.34% higher than single bids submitted to other syndicate members. We also find that high-frequency investors earn significantly higher profits, although this effect becomes less significant when we introduce quality rankings.

We find no evidence that those who submit price-sensitive or currency bids earn higher profits. Indeed, although the estimated effect is not statistically significant, submitting a price-sensitive bid is associated with *lower* profits in our sample. These results stand in contrast to those reported by CG, who found the only significant (and positive) determinant of bid profitability was whether the bid was price sensitive. To understand our result, recall that the price sensitive bids in our sample are heavily concentrated outside the hot issues. Consequently, given that the hot issues are also significantly more

Table VI
Profitability, Frequency, and Loyalty

The dependent variable for models 1 and 2 is bid profitability (\$ allocation times initial excess return over \$ value of bid), and these regressions do not include fixed effects for each IPO. The dependent variable for models 3 and 4 is normalized rationing, and fixed effects are included. Only Quality 1 and 2 effects are included, as Quality 3 and 4 effects were insignificant. The sample for models 3 and 4 is limited to those IPOs that were not “cold” (cold IPOs are less than 3× subscribed). A loyal investor in model 3 is defined as one who submitted a bid for at least one cold IPO. Model 4 further limits the sample to the two countries that experienced the most IPOs in our sample (eight each, six of which were not cold). In model 4, loyal A (B) investors are defined as those who submit a bid for an IPO in country A (B), having previously submitted a bid for at least one cold IPO in country A (B). See Tables IV and V for other data definitions. Heteroskedastic-consistent standard errors are used to calculate the *t*-values reported in parentheses.

	Dependent Variable: Profitability		Dependent Variable: Normalized Rationing	
			3	4
	1 Whole Sample	2 Quality-Ranked Bidders Only	All Countries Non-Cold Issues Quality-Ranked Bidders Only	Two Countries Non-Cold Issues Quality-Ranked Bidders Only
Bid Characteristics				
Largest bids	0.74 (5.1)	0.68 (3.6)	0.34 (4.9)	0.26 (3.2)
Large bids	0.22 (1.6)	0.26 (1.4)	0.16 (2.2)	0.13 (1.5)
Price sensitive	−0.24 (1.1)	−0.40 (1.3)	−0.04 (0.2)	0.07 (0.3)
Currency bids	0.21 (1.6)	−0.03 (0.2)	0.07 (1.1)	0.03 (0.4)
Single bid via bookrunner	1.34 (11.0)	1.18 (8.2)	0.70 (11.5)	0.60 (7.0)
Split bid via bookrunner	1.00 (5.8)	0.78 (3.8)	0.87 (7.1)	0.65 (5.9)
Split bid not via bookrunner	0.70 (2.7)	0.68 (2.3)	0.13 (1.7)	0.24 (2.2)
Bidder Characteristics				
High frequency	0.40 (3.1)	0.30 (1.9)		
Home investors	0.16 (1.1)	−0.06 (0.3)	−0.19 (3.32)	−0.16 (2.3)
Quality 1		1.4 (7.4)	0.76 (11.1)	0.76 (9.0)
Quality 2		0.41 (2.5)	0.24 (3.7)	0.19 (2.6)
Loyal			0.03 (0.6)	
Loyal A				0.24 (1.4)
Loyal B				0.02 (0.3)
R ²	2.7%	4.9%	11.9%	10.8%
Number of bids	5510	3357	2948	2018
Number of IPOs	27	27	17	12

underpriced, it is not surprising that price sensitive bids on average are less profitable.

When we re-run the regressions on the sub-set of bidders for whom we have quality rankings, we find (see Model 2) that high quality bidders earn significantly higher profits. On average, investors ranked as quality 1 experienced a profit rate more than double that of investors with quality rankings 3 to 5, with a smaller premium associated with quality 2 investors. There is strong evidence, therefore, that long-term investors are systematically rewarded *ex ante*, in terms of preferential allocations, and *ex post*, in terms of higher out-turn profits.

Once we control for investor quality, the effect of bidder frequency becomes insignificant. The fact that investors who submit more frequent bids to this particular investment bank do not earn higher profits accords with the evidence, presented in Table III, that investors are not cherry-picking. On the face of it, this evidence is broadly consistent with the hypothesis that investment banks “bundle” IPOs over time, with any preferential allocation of shares to high-frequency investors being used to compensate them for participating in the colder offerings, rather than resulting in higher profitability. We explore this issue further in the next section.

B. Are IPOs Bundled over Time?

One argument advanced in favor of bookbuilding is the ability to bundle IPOs over time (see Jenkinson and Ljungqvist (2001, Chapter 3) for a discussion of bundling). Simply put, bundling is the way in which a bookrunner is able to induce investors to bid for colder offerings by ensuring that they are compensated in other offerings. According to this argument, by lessening the winners’ curse, average underpricing is thereby reduced. But, to execute bundling, the investment banks need loyal investors.

There are various possible ways to define loyalty. If one thinks in terms of participation alone, then frequent bidders might be equated with loyal investors. However, frequency and loyalty are not the same thing. Bidders may be frequent but still only bid for hot transactions and shun colder ones. Such bidders are not helping the bookrunner out in poorer offerings and, hence, are not allowing them to bundle IPOs over time. As noted previously, we find no evidence of such cherry-picking in our sample, but the point remains that bid frequency *per se* is not an ideal variable to use to test the bundling hypothesis.

Hence, we experiment with an alternative to bidder frequency. We define a loyal investor as one who participates in at least one “cold” IPO. Ideally, we would want to add a temporal element into this definition, such as “has investor X *previously* bid in a cold IPO,” but the limited number of IPOs in our sample effectively precludes such refinements. We implicitly make the assumption that our sample of IPOs is representative of bidder behavior across a longer time period, but this is a limitation of our analysis. It is also worth remarking that we measure *ex ante* loyalty—participating in a bookbuilding where demand was weak. A case could also be made for measuring *ex post* loyalty—participating in

IPOs whose trading price falls below the issue price—as it seems quite possible that bookrunners would seek to compensate investors who had suffered such losses in subsequent hot offerings. However, in our sample, there is a strong positive relationship between subscription and initial returns, and we found no significant difference in our empirical results when we used an *ex post* definition of loyalty.

We designate an IPO as cold if it is under three times subscribed at the end of the bookbuilding. Using these definitions, 10 IPOs in our sample were cold, and 25% of investors were loyal. We then investigate whether participation in the cold IPOs results in favorable allocation in the remaining IPOs where there is strong demand. We present the results in model 3 of Table VI, where we limit our attention to those IPOs with quality rankings. Although we find that participating in at least one cold issue is positively related to allotment in the remaining issues,²⁵ the effect is both small and insignificant. We find similar results if we define the loyalty variable as a continuous variable measuring the number, or proportion, of cold issues participated in. In other respects the model results are very similar to those presented in Table V.

In the final column of Table VI, we revise the definition of loyalty (as previously explained in Section II.B) by limiting our attention to the two countries with the highest number of IPOs. In each country, two of the eight issues were cold. We then define investors as loyal when they bid in a (non-cold) IPO in their home country, having participated in at least one cold IPO in their home country²⁶—we separately identify these effects for each country as loyal A and loyal B. Restricting the analysis to these two countries reduces the sample size to 2,018 bids, of which loyal investors contributed 606. For neither country, though, is the loyalty effect significant.

Overall, we would interpret the evidence on whether IPOs are bundled over time as inconclusive. On the one hand, the finding that bidder frequency has little impact on bid profitability, combined with our prior finding that there is little evidence of cherry-picking, is consistent with certain interpretations of the bundling hypothesis. On the other hand, the finding that participation in cold offerings has no impact on allocations in the more heavily demanded IPOs runs contrary to the bundling prediction. We would, however, not view these results as definitive on the general issue of the dynamic nature of allocation decisions, as the nature of our sample precludes a full analysis. With a data set of 27 IPOs, we are severely constrained in our ability to measure loyalty in a precise way, and a more reliable analysis will have to await a larger data set. What is very clear from our analysis is that larger bids, those bids submitted by investors perceived to be long-term investors, and bids submitted through the bookrunner, obtain both preferential allocations and higher average profits.

²⁵ We also investigated whether investors in cold IPOs were rewarded with better allocations of hot IPOs, but the results were very similar.

²⁶ We also experimented with measuring loyalty as participating in a cold IPO in either country, but the results were virtually the same.

V. Conclusions

Despite the enormous quantity of research on initial public offerings, systematic evidence on the key issue of how investment banks use their discretion over allocation is extremely limited. In this paper, we contribute new evidence from 27 IPOs conducted by a leading European investment bank. We also contribute a new ranking of investors, produced by major European and U.S. investment banks, that categorizes investors according to their likelihood of being a long-term investor. We use these data to shed light on two alternative views of the allocation process: that allocations are used to elicit information production and that allocations are directed away from flippers and toward longer-term investors.

We find little support for the view that more informative bids—those that are price limited, revised, or submitted early in the bookbuilding period—receive preferential allocations or higher out-turn profits. This result holds equally in hot IPOs and less heavily subscribed offerings. In this important respect, our results are at variance with those reported by Cornelli and Goldreich (2001) based upon similar data from a different investment bank. Our results certainly cast some doubt on the generality of CG's findings and on the extent of information production during the bookbuilding period.

However, while our results regarding the relationship between allocations and informative bids differ from those of CG, in many respects, our findings are remarkably similar. Both papers identify a number of factors that significantly influence allocation: large bids get systematically better pro rata allocations, as do those bids submitted directly to the bookrunner (rather than to other members of the syndicate) and those submitted by investors that frequently submit bids to the particular investment bank. We find our results are particularly similar when we control for the level of subscription. Our sample of IPOs is considerably "hotter" than the sample of offerings considered by CG. We argue that the level of subscription is the most significant difference between our samples, rather than systematic differences in the bidders or offerings, although the proprietary nature of the data precludes an exhaustive comparison. In addition to these common findings, we also find that home investors—those from the same country as the issuing company—get lower allocations in the hot issues, but higher allocations in less well subscribed IPOs, and that investors who split their bids between syndicate members obtain higher allocations.

An important additional contribution of this paper is to match, as far as possible, the investors in our sample against an independently produced ranking that assesses the likelihood of flipping or being a long-term investor. This investor quality ranking is consistently significant in all the models we estimate and provides support for the claim—often heard in the investment banking community—that IPO allocations are directed toward long-term investors and away from flippers. We find, furthermore, that the preferential treatment of the highest quality investors is particularly strong in heavily subscribed IPOs. Since, in our sample, the level of subscription during the bookbuilding is

positively correlated with initial underpricing, long-term investors also enjoy significantly higher out-turn profits.

We also analyze whether there is any evidence that IPO allocations are bundled across issues, with allocations in hot IPOs being related to the willingness to subscribe in colder offerings. On the one hand, we find that high-frequency investors neither cherry-pick the hot issues nor, after controlling for investor quality, earn higher profits. These findings are at least consistent with the hypothesis that investment banks bundle allocations across hot and cold issues. On the other hand, when we investigate whether the willingness to subscribe to cold IPOs influences allocation in the hotter issues, we find no significant effect. However, the relatively limited number of IPOs in our data set precludes an extensive analysis, and so we view the evidence on bundling as inconclusive at present.

Finally, we note an important issue that warrants further research and that is important in interpreting our results. One noticeable difference between IPOs in the United States and Europe is the relative absence of revisions to the initial price range in European IPOs, which surely diminishes the incentive to submit price-sensitive bids in well-subscribed issues (as we observe in our sample). Explaining the stickiness of the initial price range in Europe is an interesting area of future research. It may be that the institutional environment in Europe more readily allows the exchange of information to occur prior to the bookbuilding stage.²⁷ Our results suggest that the bookbuilding period per se is more concerned with placing stock in the hands of longer-term investors than with information gathering, but this does not preclude information production happening before the bookbuilding phase and being rewarded with the final allocation. Therefore, we caution against interpreting our results as evidence against the general class of information revelation theories. The extent and impact of any such pre-bookbuilding information exchange between investors and investment banks constitute an interesting area of future research.

REFERENCES

- Aggarwal, Reena, 2000, Stabilization activities of underwriters after initial public offerings, *Journal of Finance* 55, 1075–1103.
- Aggarwal, Reena, 2003, Allocation of initial public offerings and flipping activity, *Journal of Financial Economics* 68, 111–135.
- Aussenegg, Wolfgang, Pegaret Pichler, and Alex Stomper, 2002, Sticky prices: IPO pricing on Nasdaq and the Neuer Markt, Working paper, University of Vienna.
- Benveniste, Lawrence M., and Paul A. Spindt, 1989, How investment bankers determine the offer price and allocation of new issues, *Journal of Financial Economics* 24, 213–232.

²⁷ For example, in Europe, banks' interpretation of securities laws allows them to prepare pre-deal research, provided they disclaim responsibility for investors' possible reliance on it, whereas in the United States, securities regulations prohibit the publication of pre-deal research at all. This does not prevent research analysts in U.S. IPOs from expressing their views on the floated company orally to institutions, but it does mean that they cannot share detailed financial analysis with them.

- Benveniste, Lawrence M., and William J. Wilhelm, 1990, A comparative analysis of IPO proceeds under alternative regulatory environments, *Journal of Financial Economics* 28, 173–207.
- Cornelli, Francesca, and David Goldreich, 2001, Bookbuilding and strategic allocation, *Journal of Finance* 56, 2337–2369.
- Jenkinson, Tim, and Alexander Ljungqvist, 2001, *Going Public: Second Edition* (Oxford University Press, Oxford).
- Jenkinson, Tim, Alan D. Morrison, and William J. Wilhelm, 2003, Why are European IPOs so rarely priced outside the indicative price range? Working paper, Saïd Business School, Oxford University.
- Ljungqvist, Alexander P., Tim Jenkinson, and William J. Wilhelm, 2003, Global integration in primary equity markets: The role of U.S. banks and U.S. investors, *Review of Financial Studies* 16, 63–99.
- Loughran, Tim, and Jay R. Ritter, 2003, Why has IPO underpricing changed over time? Working paper, University of Florida.
- Reuter, Jonathan, 2002, Are IPO allocations for sale? Evidence from the mutual fund industry. Working paper, MIT.
- Ritter, Jay R., and Ivo Welch, 2002, A review of IPO activity, pricing and allocations, *Journal of Finance Papers and Proceedings* 57, 1795–1828.
- Sherman, Ann, 2000, IPOs and long-term relationships: An advantage of bookbuilding, *Review of Financial Studies* 13, 697–714.
- Sherman, Ann, and Sheridan Titman, 2002, Building the IPO order book: Underpricing and participation limits with costly information, *Journal of Financial Economics* 65, 3–29.
- Zhang, Donghang, 2002, Why do IPO underwriters allocate extra shares when they expect to buy them back? *Journal of Financial and Quantitative Analysis*, forthcoming.