Journal of Financial Economics 89 (2008) 253–267

Contents lists available at ScienceDirect

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfec

On the importance of retail banking relationships ☆

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ARTICLE INFO

Article history:
Received 29 November 2006
Received in revised form
17 May 2007
Accepted 5 July 2007
Available online 8 April 2008

JEL classification:
G21
G24
G30

Keywords:
Banking
Retail
Relationships
Cross-selling
Underwriting

ABSTRACT

We use proprietary data to analyze the importance of retail banking relationships to commercial banks and their depositors when banks underwrite securities. We find lead underwriters' retail customers benefit as they demand and end up with significantly more of the highly underpriced issues. We find it is actual underpricing beyond that predicted by grey markets that drive the differential demand from the lead bank retail clientele, suggesting that banks pass on information about underpriced initial public offerings to their retail depositors. We analyze banks' incentives for such behavior and find evidence of banks benefiting through retail cross-selling—both brokerage accounts and consumer loans increase significantly.

1. Introduction

There is much theoretical and empirical literature on relationship banking. A large number of papers document the importance of bank–firm relationships in many ways.[1] In a recent survey article Boot (2000) states, "The modern literature on financial intermediaries has primarily focused on the role of banks as relationship lenders." While the bulk of the banking literature has focused on the importance of bank relationships for corporate firms, perhaps surprisingly there has been

☆ We thank Wolfgang Bessler, Mara Faccio, Mariassunta Giannetti, Oliver Keilhauer, Alexander Ljungqvist, Gunter Löffler, Kathleen McDill, Anthony Saunders, Jinghua Yan, an anonymous referee, and seminar participants at the Federal Reserve Bank, Chicago, Ohio University, University of North Carolina, the 10th Symposium on Finance, Banking, and Insurance in Karlsruhe, the Symposium on Corporate Finance at the Hong Kong University of Science and Technology, the ECB Workshop on Monetary Policy and Corporate Finance in Frankfurt, the 2006 Financial Intermediation Research Society Conference in Shanghai, the 30th anniversary conference of the *Journal of Banking and Finance* in Beijing, the 2006 EFA Meetings in Zürich, and the 2006 Federal Deposit Insurance Corporation CFR Workshop. We are grateful to the FDIC and the Hartman Fund for funding, and to the Deutsche Bundesbank for their hospitality and access to data.

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[1] The importance of bank-firm relationships has been examined by studying outside stakeholders' positive stock market reaction on an announcement or renewal of a bank loan to a firm (James, 1987; Lummer and McConnell, 1989); by studying the reduced underpricing of IPOs when there is a bank–firm lending relationship (James and Wier, 1990); and by documenting higher prices for new debt issuance when the bank is both the lender and underwriter (Puri, 1996; Gande et al., 1997). Further, it is not just new loans but the identity of the lender that is also important (Billett, Flannery, and Garfinkel, 1995). Recent work finds that bank–firm lending relationships are also important to the bank in gaining investment banking and other business (see, e.g., Bharath, Dahiya, Saunders, and Srinivasan, 2007). Banking relationships have been shown to be important particularly for small firms (see e.g., Berger and Udell, 1995; Petersen and Rajan, 1994).

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doi:10.1016/j.jfineco.2007.07.005

relatively little work on the importance of retail banking relationships.

The issue of how banks treat retail customers is an important one that has been subject to much debate. This is perhaps best captured in the controversy around the Glass-Steagall Act of 1934 and its recent repeal through Gramm-Leach-Bliley of 1999. One of the issues debated around the Glass-Steagall Act was, when commercial banks also do investment banking, how might this influence how banks treat their depositors? On the one hand banks might take advantage of their own depositors to sell "bad issues." However, if retail banking relationships are important to the bank, then banks might want to treat their retail depositors well, and inform their customers of good issues, and perhaps also allocate more of such issues in which they are the lead manager. How important are retail banking relationships? How does this affect how banks treat retail customers? What are the economic benefits to the retail investor? What are the economic benefits to the bank? These are open questions worthy of further study.

A major limitation in studying the importance of retail banking relationships is the availability of data in the context of an appropriate experiment design. In this paper, we exploit the German setting, which is a country where commercial banks have a strong presence in equity underwriting. Germany is a natural testing ground since it is the largest continental European market for equity issues in the sample period and traditionally German banks have been universal banks. We request proprietary information from the top five underwriters (who are commercial banks) both on demand and allocation for IPOs for different kinds of retail clientele. This experimental setting allows us to distinguish between lead banks' own retail clientele and other retail customers, and examine how banks treat retail investors. We then examine the rationale for such treatment and attempt to quantify the economic benefits/costs to the bank for their treatment of retail clientele.

We first examine if banks favor or discriminate against their retail investors. One of the benefits of being a lead underwriter is the control over allocation. The most obvious way to favor or discriminate against retail clientele is to give them a disproportionate allocation of underpriced (overpriced) issues, conditional on the orders received. A second, more subtle way is to influence the retail clientele bids themselves. One way of doing this would be by leaking private information about hot issues and influencing the lead bank's retail clientele to submit disproportionately higher bids than other retail clientele. We find evidence consistent with this. Our evidence suggests that the demand of the lead banks' own retail clientele is much higher for underpriced issues than for overpriced issues. Interestingly, this pattern is not observed in the demand data for other retail customers who are *not* the banks' customers. We further find evidence that allocation shares for lead and non-lead bank customers differ, with lead bank retail clientele likely to get a higher allocation of underpriced issues; but this allocation differential comes largely from the differential demand pattern.

Why do the lead bank's retail clientele demand more of the eventually underpriced IPOs? There are two possible explanations. First, lead banks convey private information that they have about the issue to retail investors, which causes the banks' retail investors to demand more of the underpriced issues. An alternative explanation is that investors are able to gauge the potential underpricing through the presence of the "grey" market with pre-IPO traded prices, and flock to the lead bank for potentially underpriced IPOs in the hope of getting better allocations. We can distinguish between these explanations by collecting grey-market prices and examining if the difference between actual and grey-market underpricing is informative in explaining the increased lead bank retail demand. Interestingly, grey-market prices in themselves do not lead to a differential demand between lead bank retail and other retail; but when issues are underpriced relative to the grey-market, there is higher demand from the lead bank's retail customers. We find an asymmetry in that when issues are overpriced as compared to the grey market, we see reduced demand by lead bank retail investors. The evidence is consistent with banks conveying private information to their retail investors to ensure more demand for better issues. This means even if allocations are done on a pro rata basis lead retail investors end up with a larger allocation of underpriced IPOs.

The natural question that follows from this is why do banks encourage their retail clientele to go for the underpriced issues? Why do banks not take advantage of depositors to dump their bad issues? Put differently, why are retail banking relationships important? What are the benefits to banks? One powerful incentive for banks to treat their retail depositors fairly is that it allows banks to use their underwriting of IPOs as a way to attract other retail business to the bank—i.e., cross-selling is a powerful incentive to treat retail customers well. If this is indeed the case, we should see that banks that actively engage in underwriting are able to use their underwriting business to boost their other businesses. To test this we collect data from the Deutsche Bundesbank in Frankfurt. We are able to obtain information from the Bundesbank on brokerage accounts, consumer loans, and corporate loans for all major banks in Germany. This gives us a natural control sample of banks that do not engage much in underwriting versus the banks who are big players in underwriting.

We find that increased IPO activity, in particular, more underwriting of underpriced IPOs is associated with an increase in the number of brokerage accounts. Interestingly, the brokerage accounts tend to be sticky and persist well after the IPO underwriting window shuts down, leading to continued profits for the bank from the fixed fees on the brokerage accounts. We quantify the economic benefits to the bank from an increased number of brokerage accounts and find these to be significant. We also find additional evidence consistent with cross-selling in other arenas such as increased retail consumer loans, which are also associated with an increase in the underwriting of IPOs. We ask whether these results can be explained by alternative stories such as aggressive loan or deposit rates, lower brokerage fees, the general growth of

the bank, or increased stock market participation. We obtain data that allow us to control for these factors and find our results to be robust to the inclusion of these factors and also to the use of instruments. As a further test, we examine whether corporate loans increase in the same way over this time period. This is a natural control group since the maximum number of IPOs underwritten by any one bank in this period is limited which means that the amount of corporate cross-selling that occurs is limited. Interestingly, we do not find an increase in corporate loans during the same time period. Our results are supportive of the notion that banks benefit from retail cross-selling through IPO underwriting activity.

This research is related to a number of strands of the literature. First, it is related to the relationship literature that has largely focused on the importance of bank–firm relationships. Our paper adds a new dimension to this literature by providing empirical evidence on the importance of retail banking relationships. Second, our paper adds to the recent literature that examines the importance of cross-selling for corporate clientele by banks by examining cross-selling in the retail context.[2] Third, there is a large theoretical and empirical literature on IPOs that looks at the distinction between institutional and retail clientele with the notion that institutional clientele are either better informed and/or favored. The assumption in the literature has implicitly been that retail clientele are a monolithic entity.[3] Our research provides some of the first evidence to suggest that different groups of retail clientele can receive different treatment based on their relationship with the underwriter. Our evidence also suggests impetus for theoretical research since how banks treat their retail clientele can more generally influence their behavior in ways that are not obvious. Finally, this paper also has implications for policy making in the debate on the expansion and appropriate scope of bank activities which has been the subject of much debate.

2. Data

In order to test whether different groups of retail clientele are treated differentially, we need data both on the demand and allocation of IPOs for the lead bank's retail clientele vis-à-vis other retail clientele. In addition, to examine underwriting banks' incentives in dealing with their retail clientele, we also need information about the underwriting banks as well as a reasonable control group of banks that do not underwrite. To meet these dual objectives we obtain proprietary data from two very different sources. The first are IPO proprietary data from the top five universal banks in Germany. The second are data from the Bundesbank in Germany. As a third data source, we use publicly available grey-market data from one of the leading German brokers in the IPO grey market. The data sources are described below.

2.1. The IPO data

First, we would like to obtain IPO demand and allocation data from all banks in Germany. However, given this is proprietary information, it is clearly a very difficult task. Our first task is therefore to identify the most relevant underwriters to test our hypotheses. The most important underwriters for our purpose are the banks with substantial retail depositors, the universal banks. We also want to control for reputation effects by obtaining data from banks with a comparable, high reputation. To get some idea of numbers, the most active underwriter in the sample period between 1997 and 2004 has a total of 44 IPOs. In this period, there are many new entrants into the German IPO business that disappear before the end of the sample period and are involved only in a few IPOs. Thus, we exclude banks that only have a minor market share and are not widely known before or after the sample period.

Given these criteria, we request demand and allocation data from the top five underwriters in the sample period, which are universal banks and responsible for 156 IPOs. We receive these data for 84 IPOs, but have to drop 12 IPOs because we lack crucial data, in particular subscription levels, leaving us with 72 IPOs. We have underwritings for each bank, ranging from a few to almost all of their underwritings in this period. Banks provide us with aggregate demand and allocation data for their own retail customers and for retail customers of other banks. Customers are classified by underwriters as retail or institutional customers according to the way in which they submit their order. Retail customers have a brokerage account with a retail subsidiary in a bank's branch network and submit their bid through the broker of that subsidiary. Their bids are then aggregated by the broker in each subsidiary and finally submitted to the order book that is managed by the investment banking division. By contrast, institutional investors have immediate access to the equity sales team of the underwriter and thus directly submit their bids to the investment banking division (i.e., wholesale business). For all 72 issues we have information on the number of shares for which retail investors submit demand as well as the number of shares ultimately allocated to them. In addition, for 44 of these IPOs we have aggregate retail demand and allocation data split by the lead underwriter's retail clientele and the retail clientele of other syndicate members.[4] For the remaining 28 IPOs, we know that the banks that provide us with the demand and allocation data for these IPOs are not the lead underwriters. Hence, the demand and allocation data for

[2] Note that this is quite distinct from the literature that examines the relationship-specific assets that lead to repeat underwriting (see, e.g., James, 1992; or Drucker and Puri, 2005).

[3] Ritter and Welch (2002) provide a detailed review of the existing theoretical and empirical IPO literature with one particular focus on the evidence for the allocations to different investor groups. Rocholl (2007) analyzes demand by and allocations to retail and institutional investors, but does not further distinguish between different groups of retail investors.

[4] Some sample banks only record the number of shares demanded by and allocated to their own retail investors, but do not record the number of shares demanded by and allocated to retail investors of other members of the syndicate. This is why no information on the latter group is provided by these banks.

these IPOs are classified as non-lead retail. These data are supplemented by publicly available information from the issuing prospectuses and data sources (such as Securities Data Corporation and Factiva). This enables us obtain the overall subscription level for these issues.

2.2. Grey market data

We obtain grey-market prices from a leading German grey-market broker. The data are partly available on the broker's internet website and are supplemented by historical data from the broker, which are available in telefaxes, and a press search in Factiva. The final dataset we compile comprises grey-market prices for 334 IPOs, and 70 of these IPOs match with our 72 sample IPOs. The master set of 334 IPOs has an average underpricing of 41.4% and a quoted bid/ask spread of 10.3%.[5]

We additionally do the following robustness checks on our 72 sample IPOs to see if there are significant differences from the universe of German IPOs with respect to grey-market prices. We find our sample corresponds quite closely to the universe. The quoted spread for our sample IPOs is very similar to that for all German IPOs and amounts to 10.54%. Further, the coefficient for the correlation between suggested grey-market and real underpricing is 0.793 for the German universe; it is 0.744 for our sample.[6] Last, but not least, Cornelli, Goldreich, and Ljungqvist (2005) show that high grey-market prices are a much better predictor for the initial return than low grey-market prices. This also holds for our sample. The coefficient for the correlation between suggested grey-market and real underpricing is 0.406 if the grey-market price is below the midpoint of the initial offer range and 0.764 otherwise.

2.3. The Bundesbank bank level data

The second proprietary data set consists of various confidential bank-specific statistics, provided by Deutsche Bundesbank and augmented with publicly available information.[7] In order to decide which banks to request data on from the Bundesbank, we first collect data from three sources of publicly available information. First, data on the number of shareholders in Germany are taken from the DAI-Factbook 2004. Second, the names of the underwriters for German IPOs are available from Deutsche Börse AG. These underwriters are ranked based on the number of IPOs that they brought to the market between 1992 and 2003. Third, the largest non-underwriting banks are identified from the 2002 ranking of the 100 largest German banks by the Association of German Banks (Bundesverband deutscher Banken). A list of the 32 largest underwriting and non-underwriting banks is created from these two data sources. This list forms the basis for our request for bank-specific data from the Bundesbank.

The Bundesbank allows researchers to work with figures for individual banks, but does not reveal the names of these banks. For this reason, the list of requested underwriting and non-underwriting banks is merged with the bank-specific Bundesbank statistics by the Bundesbank. Four of the banks are missing, as they merged during the sample period and data for the merging entities are not available. Four other banks substantially change their reporting during the sample period and are dropped for this reason. The final nine missing banks are not considered as they had either zero or less than 1,000 brokerage accounts. Consistent data are available for 15 of the 32 requested banks. For these 15 banks we have a wide variety of data available culled from different sources in the Bundesbank.

The Bundesbank data set covers the period between 1992 and 2003 and is created from four sources. Balance sheet and income statement data are from the balance sheet statistics (“Monatliche Bilanzstatistik”). Data on the number and value of brokerage accounts come from the brokerage account statistics (“Depotstatistik”). Information on retail consumer loans is provided by the borrower statistics (“Kreditnehmerstatistik”). Finally, data on interest rates for loans and deposits are from the interest rate statistics (“Zinsstatistik”).

3. Retail clientele and IPOs

Table 1 provides descriptive statistics of the 72 sample IPOs. While these are underpriced on average by 25% there is a fair amount of variation in the level of underpricing.[8] As Table 2 documents, 24 issues are underpriced by more than 25%, 21 issues have zero underpricing or are overpriced, and 27 issues are underpriced between 0% and 25%. Similar patterns obtain for the smaller sample of 44 IPOs for which we have the lead bank clientele demand.

Are there differential patterns of demand and allocation if the retail clientele is with the lead bank vis-à-vis other retail clientele? We first examine the shares demanded by all retail investors. Table 2, Panel A shows the aggregate retail demand as well as demand by various retail clienteles as a fraction of the overall demand. IPOs are split into three categories. Overpriced, i.e., the offer price is equal to or greater than the first day trading price;

[5] We compare our grey-market prices with those in Cornelli, Goldreich, and Ljungqvist (2005). In their paper, they find an average underpricing of 41.5% and a bid/ask spread of 10.2% in the sample of German IPOs. This suggests that our master data set is very similar to theirs.

[6] Suggested grey-market underpricing is defined as the percentage change between the IPO offer price and the midpoint of the last quoted bid/ask range in the grey market.

[7] The Deutsche Bundesbank has recently allowed researchers to access its data. However, three restrictions apply. First, the data are in German, hence usage of it requires the requisite translation into English. Second, there is no centralized source of data; the data are spread across the Bundesbank so researchers need to do a careful search to find the relevant source of data. Third, the data cannot be taken out of the Bundesbank, so all data work and analysis has to be done on the premises of the Bundesbank in Frankfurt.

[8] We compare our sample to IPOs underwritten by similar top-tier reputed investment banks in the same sample period in Germany. There are 67 such companies. The key descriptive statistics of our sample, as those represented in Table 1, are not distinguishable from this sample suggesting that our sample is comparable to the universe of IPOs underwritten by highly reputed banks.

Table 1
Descriptive statistics

The table shows the mean and median descriptive statistics for the 72 issuing companies. LN proceeds denote the natural logarithm of the amount raised; shares offered represent the number of shares sold in the IPO (in million); subscription level is the ratio of the number of shares demanded and shares offered; syndicate size is the number of banks in the underwriting syndicate; UPDATE is the percentage change between the midpoint of the offer range and the final offer price; Underpricing is calculated as the percentage change between the offer price and the market-closing price on the first day of trading. Subscription levels are provided by the sample underwriter. The other figures are from SDC and Factiva.

Variable	Mean	Median
LN proceeds (in € million)	19.93	18.53
Shares offered (in million)	29.38	4.08
Subscription level	21.43	11.35
Syndicate size	5.58	4
UPDATE (in %)	2.23	5.33
Underpricing (in %)	25.73	4.76

Table 2
Demand, allocation, and normalized rationing of retail investors

The table reports the demand, allocation, and normalized rationing for the lead underwriter's (lead) retail clientele and retail investors of banks that are not the lead underwriter (non-lead). Demand shares (in percent) in Panel A are calculated as the ratio of the number of shares demanded by these retail investors and the total number of shares demanded by all investors. Allocation shares (in percent) in Panel B are calculated as the ratio of the number of shares allocated to these retail investors and the total number of shares allocated to all investors. Normalized rationing in Panel C is the ratio of the share of the total supply allocated to these retail investors and the share of the total demand submitted by these retail investors. The first column reports the figures for all IPOs, the second to fourth column report the figures for different levels of underpricing (UP). The figures for the number of issues are denoted in italics. The last column reports the *z*-statistic for the comparison of means in the lowest and the highest return group. The last row reports the *z*-statistic for the comparison of means between lead and non-lead. * and ** represent significance levels of 10 and 5 percent, respectively.

	All	UP⩽0%	0%<UP⩽25%	25%<UP	All
A. *Demand shares* (*in percent of sum of shares demanded*)					
Non-lead	*72*	*21*	*27*	*24*	
	10.59	13.17	10.02	8.98	1.88*
Lead	44	*13*	*15*	*16*	
	12.64	10.73	11.59	15.18	1.85*
z-Stats	1.23	1.03	0.18	2.38**	
B. *Allocation shares* (*in percent of sum of shares sold*)					
Non-lead	*72*	*21*	*27*	*24*	
	10.60	13.07	10.73	8.30	1.92*
Lead	*44*	*13*	*15*	*16*	
	12.41	10.22	14.59	12.16	0.54
z-Stats	1.18	0.62	0.88	2.54**	
C. *Normalized rationing of retail investors*					
Non-lead	*72*	*21*	*27*	*24*	
	1.13	1.14	1.22	1.00	0.64
Lead	*44*	*13*	*15*	*16*	
	0.99	0.91	1.14	0.92	0.07
z-Stats	0.73	0.88	0.56	0.23	

moderately underpriced where the range of underpricing is in the range of 0–25%; and highly underpriced where the level of underpricing is greater than 25%. There is an interesting pattern in the proportional demand of lead underwriter retail clientele versus non-lead underwriter retail clientele. The percentage of shares demanded by the lead banks' retail clientele increases from 10.73% for overpriced issues to 11.59% for moderately underpriced issues and 15.18% for highly underpriced issues. In contrast, the percentage of shares demanded by non-lead bank clientele trends downward from 13.17% for overpriced issues, 10.02% for moderately underpriced issues, and 8.98% for highly underpriced issues. Thus, lead underwriters retail clientele demonstrate an upward trending demand, while there is a downward trending demand for other retail clientele; the difference between the two is statistically significant.

Next we examine allocations to different retail groups. Table 2, Panel B examines the raw allocation percentage to lead retail clientele and non-lead retail clientele as a fraction of the overall supply. It shows an interesting pattern, namely, lead retail customers get a higher allocation of highly underpriced issues than non-lead retail. Thus, lead retail get 10.22% of overpriced issues, 14.59% of moderately underpriced issues, and 12.16% of highly underpriced issues. In comparison, all other retail get 13.07% of overpriced issues, 10.73% of moderately underpriced issues, and only 8.30% of highly underpriced issues. Hence ultimately, the lead bank retail clientele earn higher profits from the allocated IPOs than the non-lead bank retail clientele. However, these higher profits are due to the differences in demand rather than the differences in allocation. Table 2, Panel C examines normalized rationing, which is the ratio of the share of the total supply allocated to these retail investors and the share of the total demand submitted by these retail investors. It shows that there is no statistically significant difference between different groups of investors for the allocation conditional on demand. The results suggest a pro-rata allocation to retail investors and that the difference in allocated shares comes largely from differences in demand.[9]

Taken together, the allocation to lead and non-lead retail decreases for the more favorable IPOs. This implies that the residual, the allocation to institutional investors, increases for more favorable IPOs. In the 44 IPOs for which data are available for both retail groups, the institutional allocations amount to 73.07% for overpriced issues, 74.27% for moderately underpriced issues, and 78.12% for highly underpriced issues, where the difference between the first and the last group is significant at the 10% level (t-statistic = 1.69).

The above results are interesting but only suggestive as we also need to control for other factors. We next test for differences in demand and allocation to different sets of

[9] We repeat the analysis for non-lead retail in Table 2 separately for the 44 IPOs for which information on lead and non-lead retail is available and for the 28 IPOs for which information is available only for non-lead retail. The results suggest that the demand and allocation patterns for the two groups are very similar. In both groups, demand and allocation shares decrease for issues with a higher level of underpricing, and the normalized rationing for both groups and the different return categories is close to one.

Table 3
Demand OLS regression for IPOs—real underpricing

The three dependent variables are the demand shares for non-lead retail and lead retail investors, and the ratio of the demand shares for lead to non-lead retail investors. LNPROCEEDS and LN syndicate size are the logs of proceeds and syndicate size, respectively. High-tech stocks are those with SIC codes 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3671, 3672, 3674, 3675, 3677, 3678, 3679 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (measuring and controlling devices), 3841, 3845 (medical instruments), 4812, 4813 (telephone equipment), 4899 (communications services), and 7371, 7372, 7373, 7374, 7375, 7378, and 7379 (software), see Loughran and Ritter (2004). Real underpricing (RUP) is defined as the percentage difference between the offer price and the closing price of the IPO on the first day of trading. Price update is the percentage change between the midpoint of the filing range and the offer price. *, **, and *** represent significance levels of 10, 5, and 1 percent, respectively.

	Non-lead retail (1)	Non-lead retail (2)	Non-lead retail (3)	Lead retail (4)	Lead retail (5)	Lead retail (6)	Demand ratio(7)
Constant	0.414	0.429	0.443	0.200	0.258	0.244	0.763
	(2.40)**	(2.27)**	(2.13)**	(1.16)	(1.53)	(1.32)	(0.12)
LNPROCEEDS	−0.011	−0.013	−0.013	−0.001	−0.004	−0.003	−0.037
	(1.27)	(1.27)	(1.36)	(0.12)	(0.41)	(0.25)	(0.11)
LN syndicate size	−0.022	−0.022	−0.022	−0.071	−0.071	−0.065	−1.079
	(1.10)	(1.29)	(1.22)	(2.90)***	(2.83)***	(2.42)**	(1.09)
= 1 if high−tech industry	0.004	−0.007	−0.008	−0.040	−0.041	−0.041	2.445
	(0.14)	(0.23)	(0.27)	(1.53)	(1.51)	(1.44)	(1.88)*
Real underpricing (RUP)	−0.031	−0.031	−0.031	0.030	0.030	0.033	2.102
	(1.81)*	(1.78)*	(1.74)*	(1.97)*	(1.95)*	(2.13)**	(2.42)**
= 1 if issue in 1999/2000		0.031	0.032		−0.011	−0.015	−0.102
		(1.19)	(1.23)		(0.44)	(0.59)	(0.09)
Price update			−0.004			−0.013	−0.358
			(0.24)			(0.76)	(0.50)
Number of observations	72	72	72	44	44	44	44
R^2	0.09	0.12	0.13	0.30	0.32	0.32	0.28

retail investors in a multivariate framework. We use the following independent variables:

LNPROCEEDS: The size of the issue is likely to be important as larger IPOs may attract more attention and more subscribers. Conversely, it could be the case that it is harder to get the necessary subscription in larger IPOs and that more marketing effort is needed.

LN SYNDICATE SIZE: The syndicate size should affect the demand and perhaps the allocation of IPO shares for lead retail as opposed to other retail. The larger the syndicate size, the smaller one would expect the lead retail customers' demand and allocation to be.

HI-TECH INDUSTRY: The kind of industry could be important as shown e.g., by Loughran and Ritter (2004), and following their procedure we incorporate a dummy if the issue is in the high-tech industry.

TIMING: The 1999–2000 market was a hot market. This can influence investor demand and accordingly we introduce a timing dummy corresponding to this period.

PRICE UPDATE: Finally, the final offer price as related to the mid-point of the filing range has been shown to be a significant determinant of underpricing in US IPOs (see, e.g., Hanley, 1993; Aggarwal, Prabhala, and Puri, 2002). Hence we also include this variable to capture the percentage difference between the offer price and the mid-point of the filing range.

We examine how demand and allocation to retail customers are affected by the level of underpricing, after controlling for the above factors.[10] We have three separate dependent variables in the OLS regressions.[11] The first is the demand share by lead retail customers. The second is the demand share by non-lead retail customers. The third dependent variable is the ratio of the demand share of lead retail and non-lead retail customers.

Table 3, column 1, has the dependent variable as the percentage of shares demanded by non-lead retail customers. The only independent variable that is significant is underpricing. The higher the underpricing, the less the percentage of shares demanded by other retail investors, even after controlling for other factors. We add as independent variables our timing dummy in column 2, and then price update in column 3. In each case the additional variables are insignificant, and underpricing continues to be statistically significant.

Table 3, columns 4–6, show similar regressions in which the dependent variable is lead bank retail clientele. The table shows that the percentage of shares demanded by these customers is significantly affected by two factors. First, as syndicate size goes up, the percentage of shares demanded by lead retail customers goes down. This is quite intuitive since with a larger syndicate there are more retail customers in aggregate applying for shares. Second, and for our purpose, the important variable is underpricing, which is positive and significant. The more the issue is underpriced, the higher the percentage of shares demanded by lead retail customers. Finally, the estimation in column 7 of Table 3 considers the demand shares for both groups of retail customers simultaneously and

[10] To address the potential simultaneity between the demand share by retail investors and the level of underpricing, we rerun the regressions with the oversubscription level as an alternative variable. The results do not change.

[11] The sample demand and allocation shares contain no extreme values of zero or one. Nonetheless, we rerun the estimations using the fractional logit model that is suggested for these cases by Papke and Wooldridge (1996). The results do not change.

suggests that the ratio of the demand shares of lead retail and non-lead retail customers increases with higher levels of underpricing. All put together, Table 3 paints a reasonably convincing picture that lead retail customers' demand for shares is positively related to underpricing, and this seems to be at the expense of other retail investors.

Why do we see these differential patterns in demand? Lead bank retail clientele appear to have better information about underpriced issues than non-lead bank retail clientele. There are two possible explanations. One possible explanation is that the lead underwriter conveys information about good issues to its retail customers leading to a proportionately higher subscription of underpriced issues by its retail customers. A second possibility is that retail customers may submit orders to banks who are the lead in issues that are anticipated to be highly underpriced, in the hope that the lead bank will allocate more to its own retail clientele.

We test for which explanation holds in the data by using when-issued markets in European IPOs as a source of information on the amount of anticipated underpricing for investors. In these forward markets, which are provided by several independent brokers, contracts on the issuing shares are traded. The prices for these contracts are continuously updated and are made publicly available. Cornelli, Goldreich, and Ljungqvist (2005) provide a detailed description of these markets and document a positive relation between the price in the when-issued market and the price in the aftermarket. We examine if the differential demand between lead and non-lead bank retail customers is driven by grey-market prices. We ask if retail investors follow the prices in the grey-market, and for issues for which the grey-market prices suggest potential underpricing, whether investors flock to the lead bank for placing their orders, perhaps hoping for better allocations. Table 4 reports the regression results for demand shares with the same control variables as in Table 3. But instead of using the real underpricing, we use grey-market underpricing as the key explanatory variable. The results in columns 1–5 show that the demand share by neither group of retail customers nor the demand ratio is significantly related to grey-market underpricing. This stands in strict contrast to the previous results where real underpricing is significantly related to demand patterns of the retail groups. This suggests that the differential demand by lead and non-lead bank retail clientele is not driven by observed grey-market pricing but that the explanation lies elsewhere.

A potential alternative hypothesis could be that non-lead retail customers assume that their banks are allocated fewer shares in hot issues and therefore submit their demand to lead banks with which they expect a

Table 4
Demand OLS regression for IPOs—grey-market underpricing

The three dependent variables are the demand shares for non-lead retail and lead retail investors, and the ratio of the demand shares for lead retail and non-lead retail investors. LNPROCEEDS and LN syndicate size are the logs of proceeds and syndicate size, respectively. High-tech stocks are those with SIC codes 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3671, 3672, 3674, 3675, 3677, 3678, 3679 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (measuring and controlling devices), 3841, 3845 (medical instruments), 4812, 4813 (telephone equipment), 4899 (communications services), and 7371, 7372, 7373, 7374, 7375, 7378, and 7379 (software), see Loughran and Ritter (2004). Real underpricing (RUP) is defined as the percentage difference between the offer price and the closing price of the IPO on the first day of trading. Grey-market underpricing (GMUP) is defined as the percentage difference between the offer price and the midpoint of the final bid-ask range of the IPO in the grey-market. Price update is the percentage change between the midpoint of the filing range and the offer price. RUP−GMUP is the difference between real underpricing and grey-market underpricing. RUP−GMUP^{+} (RUP−GMUP^{-}) is equal to RUP−GMUP, if RUP−GMUP is positive (negative), and zero otherwise. * and ** represent significance levels of 10 and 5 percent, respectively.

	Non-lead retail (1)	Non-lead retail (2)	Lead retail (3)	Lead retail (4)	Demand ratio (5)	Demand ratio (6)	Demand ratio (7)
Constant	0.323	0.346	0.305	0.344	5.474	8.067	7.935
	(1.80)*	(1.78)*	(1.81)*	(1.85)*	(0.93)	(1.42)	(1.37)
LNPROCEEDS	−0.009	−0.010	−0.006	−0.007	−0.195	−0.366	−0.356
	(1.03)	(1.14)	(0.69)	(0.80)	(0.63)	(1.22)	(1.16)
LN syndicate size	−0.020	−0.210	−0.057	−0.051	0.014	0.601	0.611
	(0.90)	(0.90)	(2.22)**	(1.80)*	(0.02)	(0.64)	(0.64)
= 1 if high-tech industry	−0.007	−0.017	−0.040	−0.043	1.244	1.745	1.756
	(0.27)	(0.56)	(1.51)	(1.51)	(1.19)	(1.73)*	(1.71)*
Grey-market under-pricing	−0.002	−0.001	0.018	0.019	0.466	0.824	0.809
(GMUP)	(0.14)	(0.05)	(1.15)	(1.15)	(0.85)	(1.52)	(1.46)
RUP−GMUP						1.234	
						(2.17)**	
RUP−GMUP^{+}							1.728
							(0.87)
RUP−GMUP***							1.185
							(1.95)*
= 1 if issue in 1999/2000		0.033		0.001	−0.909	−0.846	−0.892
		(1.21)		(0.00)	(1.03)	(1.01)	(1.03)
Price update		−0.007		−0.010	−0.398	−0.865	−0.889
		(0.42)		(0.55)	(0.66)	(1.42)	(1.42)
Number of observations	70	70	44	44	44	44	44
R^2	0.04	0.08	0.27	0.28	0.15	0.27	0.27

better allocation. Under this explanation, the observed demand patterns would be due to the anticipation of the (lack of) access to hot issues rather than to private information provided by the lead underwriter. However, the results in Table 4, based on grey-market underpricing, which is the only publicly available information before the IPOs, speak against this hypothesis. That is, the results are not consistent with retail investors moving to the lead bank for issues that are likely to be hot based on grey-market pricing, in the hope of better allocations.

We next conduct additional tests to see if the amount of actual underpricing over and above the grey-market prices has explanatory power for the differential lead and non-lead bank retail demand. Column 6 of Table 4 shows that the demand ratio of lead and non-lead retail customers is significantly related to the difference between the real and the grey-market underpricing. The higher the difference between the actual and the grey-market underpricing is, the higher the demand share of lead retail investors in comparison to the demand share of non-lead retail customers. We additionally test for a potential asymmetry in this result, for when issues are underpriced or overpriced in relation to the grey-market prices. For this purpose we create two new variables. The first variable, RUP−GMUP+, is equal to the difference between real and grey-market underpricing if this difference is positive and zero otherwise. Equivalently, RUP−GMUP- is equal to the difference between real and grey-market underpricing if this difference is negative and zero otherwise. Column 7 of Table 4 shows that lead retail customers demand significantly less when the grey-market underpricing is larger than the real underpricing. They tend to demand more when the real underpricing is larger than the grey-market underpricing, but this result fails to be significant. This suggests that the lead bank mainly uses its private information to limit its retail customers' demand of issues that are potentially over-priced as compared to the grey-market prices. This result is consistent with a private information story in which the bank influences the demand of its retail investors, limiting it to the better issues.

Table 5 examines allocations for these two groups of retail investors. In Table 5, column 1, the dependent variable is the percentage of shares allocated to non-lead retail clientele. Notice that in column 1, the only significant variable is the underpricing of the IPO which is negatively related to the allocation to non-lead retail clientele. We add other factors such as timing and the price revision to the estimation shown in column 2 and finally control for the demand share by non-lead retail clientele in the estimation in column 3. In each of these estimations, underpricing remains significant, albeit weakly. At the same time, the demand share in column 3 is highly significant, which confirms the univariate result in Table 2 that allocation widely follows demand. In columns 4–6 we examine the factors affecting lead retail customers' allocation. In column 5 the only variable that is significant is Ln syndicate size. When we add the timing variable, price update, and demand, demand turns out to be very important again and is statistically and economically the most significant factor. This is entirely intuitive as allocation should indeed be a function of the demand and it is consistent with the evidence from the allocation results for non-lead retail clientele. In all, the results

Table 5
Allocation OLS regression for IPOs

The two dependent variables are the allocation shares for non-lead retail and lead retail investors. LNPROCEEDS and LN syndicate size are the logs of proceeds and syndicate size, respectively. High-tech stocks are those with SIC codes 3571, 3572, 3575, 3577, 3578 (computer hardware), 3661, 3663, 3669 (communications equipment), 3671, 3672, 3674, 3675, 3677, 3678, 3679 (electronics), 3812 (navigation equipment), 3823, 3825, 3826, 3827, 3829 (measuring and controlling devices), 3841, 3845 (medical instruments), 4812, 4813 (telephone equipment), 4899 (communications services), and 7371, 7372, 7373, 7374, 7375, 7378, and 7379 (software), see Loughran and Ritter (2004). Real underpricing (RUP) is defined as the percentage difference between the offer price and the closing price of the IPO on the first day of trading. Price update is the percentage change between the midpoint of the filing range and the offer price. RUP and Price update are categorical variables with levels 1–3. Demand (in %) is the demand share of the respective group. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

	Non-lead retail (1)	Non-lead retail (2)	Non-lead retail (3)	Lead retail (4)	Lead retail (5)	Lead retail (6)
Constant	0.210	0.226	0.004	0.218	0.401	0.015
	(1.30)	(1.35)	(0.98)	(1.14)	(1.84)*	(0.10)
LNPROCEEDS	−0.002	−0.004	0.004	−0.001	−0.009	0.003
	(0.28)	(0.46)	(0.55)	(0.03)	(0.74)	(0.43)
LN syndicate size	−0.004	−0.007	−0.014	−0.078	−0.074	−0.030
	(0.21)	(0.36)	(0.58)	(2.84)***	(2.25)**	(1.36)
= 1 if high-tech industry	−0.015	−0.027	−0.014	−0.039	−0.043	0.006
	(0.54)	(0.97)	(0.58)	(1.32)	(1.26)	(0.25)
Real underpricing (RUP)	−0.025	−0.029	−0.035	0.014	0.016	−0.007
	(1.76)*	(1.81)*	(1.68)*	(0.86)	(0.85)	(0.54)
= 1 if issue in 1999/2000		0.052	0.031		−0.031	−0.036
		(2.11)*	(1.38)		(1.01)	(1.82)*
Price update		−0.001	0.007		−0.005	0.010
		(0.01)	(0.49)		(0.23)	(0.80)
Demand (in %)			0.516			0.783
			(4.96)***			(6.16)***
Number of observations	72	72	72	44	44	44
R^2	0.10	0.11	0.50	0.25	0.28	0.67

indicate that underpricing of the IPO is, at best, weakly significant in affecting allocation to non-lead retail and insignificant in affecting allocation to lead retail. The results in column 3 and 6 in Table 5 confirm the univariate results in Table 2 that the allocation of shares to retail investors is driven by the demand that these investors submit rather than the discretionary behavior by underwriters in their allocation decision. The results are also useful in reconsidering the observation in Table 2 that, in highly underpriced issues, the allocation share for lead retail clientele is further away from their demand share than for non-lead retail clientele. Once control factors are incorporated in the analysis, underpricing has no explanatory power for the allocation to lead retail clientele any more, while it tends to be, at best, weakly negatively related to the allocation to non-lead retail clientele.

The overall picture is one in which lead underwriter retail clientele end up demanding more of the underpriced issues. Contrary to the beliefs of some, banks are not using their clout with retail customers to push subscriptions to "lemons" or overpriced issues. Rather the evidence is consistent with the notion that banks encourage their customers to subscribe to "hot" issues rather than "lemons," and treat them fairly in allocations. Ultimately, this allows lead bank retail clientele to obtain higher profits than other banks' retail clientele.

Why should banks engage in such behavior? One plausible explanation is that of "cross-selling." By treating their retail customers fairly in "hot" IPOs, encouraging their demand for such IPOs, and not dumping them with more of the overpriced "lemons," banks ensure that more and more customers will open brokerage accounts with them in order to apply for allocation of these IPOs and perhaps also use other services of the bank. We use the aggregate level bank data we obtain from the Bundesbank to explore this more fully.

4. Cross-selling to retail clientele

The second data set we collect and now use consists of various confidential bank-specific statistics, which are provided by Deutsche Bundesbank, augmented with publicly available information from other sources. This data set covers the period between 1992 and 2003. To begin our analysis, it is useful to compare and contrast private banks that underwrite IPOs to private banks that do not underwrite. We have data on 15 banks of which four are the traditional big players, five are newcomers to underwriting, and six are non-underwriters.

4.1. Growth of brokerage accounts

Table 6 shows the difference in growth rates in the number of brokerage accounts across these three groups of private banks. The main difference is found in the period 1997–2000, where the growth in brokerage accounts with big players is 11.4% and with new underwriters is 9.6%, while for non-underwriters it is only 2.4%. Before 1997 and after 2000 the growth rates across the different bank groups are very similar and not statistically different from each other. The same holds for the growth rates in each of the given bank groups before 1997 and after 2000. The significance tests in Table 6 confirm that the main differences arise from the underwriting banks, which are the big players, and the new underwriters, in the period between 1997 and 2000.

Table 6
Growth rate in number of retail brokerage accounts by IPO lead underwriters

The growth rate is the percentage difference in the number of brokerage accounts between the end of the previous and the end of the reported year. These figures are reported for each year between 1993 and 2003 and for three sub-periods. They are calculated from the yearly brokerage account statistic ("Depotstatistik") at Deutsche Bundesbank. Averages are reported for three groups of banks: (1) Banks that were traditionally lead underwriters in Germany ("Big players"); (2) Banks that only became lead underwriters in the boom period between 1997 and 2000 ("Newcomers"); (3) Banks that are not lead underwriters throughout the period ("Non-underwriters").

	Big players (4) (%)	Newcomers (5) (%)	Non-underwriters (6) (%)
1993	2.87	−7.86	−5.52
1994	6.65	7.61	3.46
1995	−3.21	−3.88	−4.14
1996	1.93	1.97	−2.92
1997	4.22	4.31	−2.32
1998	5.57	11.34	1.79
1999	19.85	10.15	1.14
2000	16.65	12.64	9.41
2001	−2.54	0.91	−0.11
2002	0.93	−1.66	2.81
2003	0.58	−2.64	−2.35
Sub-periods			
1993–1996	2.00	−0.71	−2.34
1997–2000	11.37	9.56	2.42
2001–2003	−0.36	−1.14	0.09
(a) *Comparison between time periods for a given bank group*			
1993–1996/ 1997–2000	2.22**	4.44***	2.62**
1997–2000/ 2001–2003	2.51**	4.73***	0.82
1993–1996/ 2001–2003	0.70	0.07	0.04
(b) *Comparison between bank groups for a given time period*			
1993–1996	1.09	1.27	0.17
1997–2000	0.97	4.01***	2.56**
2001–2003	0.29	0.23	0.35

Clearly the growth in brokerage accounts can be affected by other factors. We build a set of factors that, a priori, might affect brokerage account growth. The first factor is increased stock market participation in general, which could lead to an increase in brokerage accounts. In order to control for this we create a variable to capture the growth of shareholders. The 1999–2000 period was one of heightened stock market activity which could also lead to a growth of brokerage accounts, so we create a dummy variable to capture this time period. The second factor that could influence the growth of brokerage accounts is the general growth of the bank. If it is the case that the bank is growing in general then this could account for the growth in brokerage accounts. To control for this we create a

variable which is growth in bank assets. The third factor that could be responsible for the growth in brokerage accounts could be aggressive pricing by the bank. We obtain estimates of the brokerage fees as well as the lending and deposit rates of the bank to take this possibility into account. The independent variables that we use are given below.

LN assets: The size of the bank is likely to be important though it is not obvious in which direction this factor will play. A larger bank may find it more difficult to achieve the same growth rates in retail business as a smaller bank, given the larger starting base. Conversely, a larger bank may use its economies of scale by being able to sell a broader range of products.

Growth in assets: The growth in a bank's number of brokerage accounts might reflect a general growth in business. Therefore, it is important to control for a bank's growth in assets. We define growth in assets as the percentage change in bank assets between $t-1$ and t.

Deposit rate: A bank might offer high interest rates on deposits relative to its competitors to attract customer deposits and cross-sell other retail products. We define deposit rate as the difference between the rate that a bank offers their customers for a 1-month deposit of less than DM 100,000/EUR 50,000 and the average rate across all banks for these deposits.

Loan rate: The growth in retail loans depends on the interest rate that a bank charges in comparison to its competitors' rates. The lower the rate, the easier it should be for a bank to sell loans to retail customers. Also, a low rate might be used as a cross-selling mechanism to attract other retail business, as for example brokerage accounts. We define loan rate as the difference between the rate that a bank charges its retail customers for a loan with a value of less than DM 200,000/EUR 100,000 and the average rate across all banks for these loans.

Brokerage fees: The growth in the number of brokerage accounts per bank is expected to decrease with the brokerage fees that a bank charges its customers for opening and maintaining a brokerage account. Lower brokerage fees might also be used to cross-sell other products. Brokerage fees are from the *FINANZtest* publication and represent the yearly fees to be paid for a brokerage account with a volume of EUR 50,000 (as of March 2003).

Growth in shareholder base: The number of brokerage accounts by retail customers in a bank should be positively correlated to the number of shareholders in the population. The more investors enter the stock market, the more brokerage accounts need to be opened. The number of shareholders in Germany is calculated on a yearly basis by the Deutsches Aktieninstitut (DAI) and the growth rates per year are included as a control variable.

Timing: The 1999–2000 market was a hot market. This can influence a bank's behavior in attracting retail business and deciding on the creditworthiness of retail customers. Accordingly, we introduce a timing dummy corresponding to this period.

Number of SEOs/underwritings: Seasoned equity offerings (SEOs) represent the second major part of a bank's equity underwriting business and might also have an impact on the growth of the bank's retail business. Thus, two additional control variables are employed: number of SEOs is the number of SEOs for which a bank is the lead underwriter in a given year. Number of Underwritings is the sum of the number of IPOs and the number of SEOs for which a bank is the underwriter in a given year.

Table 7 reports the results of a multivariate regression in which the dependent variable is the growth in the number of brokerage accounts. Consistent with our intuition, this variable is significantly related to the number of IPOs. The results in column 2 of Table 7 show that this not the case for the number of SEOs, as the number of SEOs does not significantly influence the growth in brokerage accounts. The results for the combined number of IPOs and SEOs, which are reported in column 3, show that these are positively related to the growth in brokerage accounts. However, in light of the results in columns 1 and 2, this significant result is driven by the number of IPOs rather than by the number of SEOs. Next, we add as control variables the growth in shareholder base and a timing dummy for the years 1999 and 2000. The results are reported in column 4 and are very similar to our earlier results. In all these specifications we estimate the regression as a pooled OLS and adjust the standard errors for heteroskedasticity and clustering. To test for the possibility of serial correlation in the error term, we employ the test for autocorrelation in panel data models suggested by Wooldridge (2002). The test statistic is insignificant with a p-value of 0.38. Nonetheless, we rerun the estimations with Newey-West standard errors with lags of up to 2, and the results do not change. More generally, we rerun the estimations with an error-components model and find similar results. Next, we replace the number of IPOs with the number of underpriced IPOs. The results are reported in column 5 of Table 7 and show number of underpriced IPOs to be positively and significantly related to growth in brokerage accounts.[12] A related question is whether there is a difference between big players and newcomers with respect to the impact that IPO underpricing has on brokerage business. The estimations in columns 1 and 5 are thus rerun with two interaction variables; the first variable captures the number of (underpriced) IPOs underwritten by the big players, while the second variable represents the number of (underpriced) IPOs underwritten by the newcomers. The coefficients for these two variables are economically almost identical, suggesting that the impact of underpricing is similar for big players and newcomers.

There is still the possibility that the number of IPOs underwritten is not entirely exogenous. In particular, a contemporaneous increase in the number of IPOs and the growth in other business fields may be influenced by the same exogenous shock. If the number of IPOs underwritten is correlated with the error term then we have a potential problem in our estimation. To correct for this we

[12] During the sample period and for the sample banks, 78.39% of the IPOs are underpriced. The number of IPOs and the number of underpriced IPOs are thus highly correlated with a correlation coefficient of 0.94 and would impose severe multicollinearity if used simultaneously.

Table 7
Multivariate analysis—growth in number of brokerage accounts

The dependent variable is the growth in the number of brokerage accounts. These figures are calculated from the statistics of brokerage accounts ("Depotstatistik") at Deutsche Bundesbank. LNASSETS is the natural logarithm of bank assets. Growth in assets is the percentage change in assets between $t-1$ and t. Loan rate is the difference between the rate that a bank charges its retail customers for a loan with a value of less than DM 200,000/EUR 100,000 and the average rate across all banks for these loans. Deposit rate is the difference between the rate that a bank offers their customers for a 1-month deposit of less than DM 100,000/EUR 50,000 and the average rate across all banks for these deposits. Brokerage fees are from the *FINANZtest* publication and represent the yearly fees to be paid for a brokerage account with a volume of EUR 50,000 (as of March 2003). Number of (underpriced) IPOs is the number of (underpriced) IPOs for which a bank is the lead underwriter in a given year. Number of SEOs is the respective number for SEOs. Number of underwritings is the total number of IPOs and SEOs. Growth in shareholder base is the percentage change in the number of shareholders in Germany in a given year, as published by the DAI (Deutsches Aktieninstitut). Column 6 shows the first-stage regression for the IV estimations in cols 7 and 8. Standard errors are adjusted for heteroskedasticity and time-clustering. *, **, and *** represent significance levels of 10, 5, and 1 percent, respectively.

	OLS estimation Growth in number of brokerage accounts (in %)					Number of IPOs	IV estimation Growth in number of brokerage accounts (in %)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.082	0.075	0.071	0.040	0.034	−3.477	0.091	0.058
	(0.87)	(0.17)	(0.68)	(0.45)	(0.38)	(1.52)	(0.91)	(0.59)
LNASSETS	−0.004	−0.003	−0.004	−0.002	−0.001	0.211	−0.005	−0.003
	(0.84)	(0.65)	(0.75)	(0.35)	(0.28)	(1.65)	(0.91)	(0.51)
Growth in assets	0.085	0.082	0.157	0.040	0.035	2.188	0.078	0.032
	(1.22)	(1.12)	(2.01)**	(0.59)	(0.50)	(1.05)	(0.91)	(0.47)
Loan rate	−0.096	−0.097	−0.101	−0.108	−0.108	−1.393	−0.094	−0.103
	(2.23)**	(2.28)**	(3.01)***	(3.09)***	(3.03)***	(1.19)	(1.96)*	(2.46)**
Deposit rate	0.480	0.474	0.499	0.419	0.431	−4.709	0.482	0.430
	(1.65)	(1.65)	(1.77)*	(1.22)	(1.30)	(1.17)	(1.67)	(1.25)
Brokerage fees	−0.035	−0.042	−0.039	−0.036	−0.030	0.003	−0.037	−0.039
	(0.33)	(0.35)	(0.50)	(0.36)	(0.31)	(0.11)	(0.33)	(0.37)
Number of IPOs	0.017	0.017		0.008			0.018	0.011
	(9.75)***	(7.79)***		(2.56)**			(3.51)***	(1.76)*
Number of SEOs		−0.001						
		(0.29)						
Number of underwritings			0.006					
			(2.56)**					
Number of IPOs ($t-1$)						0.306		
						(4.02)***		
Growth in shareholder base				0.197	0.196	5.048		0.183
				(4.65)***	(4.92)***	(2.14)**		(4.72)***
= 1 if 1999 or 2000				0.039	0.046	2.135		0.031
				(3.46)***	(4.55)***	(3.52)***		(1.82)*
Number of underpriced IPOs					0.009			
					(3.75)***			
Number of observations	122	122	122	122	122	122	122	122
R^2	0.31	0.31	0.39	0.39	0.39	0.49	0.31	0.39

look for a suitable instrument. One possible solution is to use the one-period lagged number of IPOs. This has to fulfill some requirements to be a valid instrument. First, the number of IPOs a bank underwrites in a given year has to have predictive power for the number of IPOs this bank underwrites in the subsequent year. The first-stage regression results in column 6 of Table 7 show that the coefficient for the lagged number of IPOs is indeed highly significant. In addition, we also perform the test suggested by Bound, Jaeger, and Baker (1995). They caution that any instrument needs to be sufficiently correlated to the endogenous variable and recommend a test to check if the instruments are weak. Their test calculates the R^2 of the first-stage regression with the included instruments "partialled-out" (equivalently described as the F-test of the joint significance of the excluded instruments in the first-stage regression). As a rule of thumb, instruments are weak if the F-statistic is below ten. For the one-period lagged number of IPOs, the F-statistic amounts to 16.44; this helps to put to rest concerns that our instruments are weak.

We reestimate our specification with the one-period lagged number of IPOs underwritten by the bank as an instrument (Instrumental Variable (IV) estimation). The results are reported in Table 7, columns 7 and 8. After instrumenting for the number of IPOs we obtain very similar results as found before. Put together, the evidence suggests that the higher the volume of IPOs underwritten by the bank, the greater the growth in brokerage accounts after controlling for other factors.

4.2. Economic benefits of the brokerage accounts to the bank

How attractive are these brokerage accounts for the bank? One way to gauge the attractiveness of brokerage accounts is to try to get a handle on the amount of fees that these accounts generate. There are two sources of fee revenue in such accounts. The first arises from transaction fees on trading activities. Information from customer handouts of two of the major banks (Deutsche Bank and

Dresdner Bank) suggests that transaction fees for trading in the sample period are 1%. Based on estimated trading volume from multiple sources, the average amount of trading fees on a given account is in the range of €300 per year.[13]

The second source of fees is the fixed fees on the account itself, absent any trading activity. Fees for brokerage accounts are billed on a yearly basis and are the higher of a minimum fixed fee or a percentage of the market value of the brokerage account. The yearly minimum fees for regular brokerage accounts range from €20 to €100, while the percentage of the market value averages 0.15% across banks. Table 6 suggests that the number of brokerage accounts does not decrease over time, even when the IPO period shuts down. Thus, there is a growth of 11.4% in brokerage accounts for the big four players and a growth of 9.6% for the new bank underwriters in the period 1997–2000, but a trivial decline of less than half a percent for the big four players and 1.1% for the new underwriters in the period 2001–2003. This suggests that even if the motivation for opening brokerage accounts is for IPO subscription, once opened, the brokerage accounts have a life of their own and tend to stay open well after the IPO activity is over, generating fixed fees even if there is no trading activity.[14]

The four big players in the previous analyses saw an average increase of 450,000 brokerage accounts between 1993 and 2003.[15] As a back-of-the-envelope estimate, the increase in the number of brokerage accounts therefore generated, on average, yearly additional revenues of almost €36.5 million for each of these banks, just from the pure existence of the brokerage accounts (computation assumes €81 per year, see footnote 14). Note that this is a conservative figure, as it does not consider the revenues from trading in these accounts and any potential for cross-selling of other retail products. Hence, the economic benefit to the bank from an increase in brokerage accounts is high, per account and overall. In addition there are likely to be other cross-selling benefits that we document below that we have not accounted for in these numbers. Hence, this number is likely to be a lower bound on the economic benefit to the bank from the increased brokerage accounts.

[13] A major German bank provided us with figures on their regular, non-online retail customers' trading behavior in 2003. In an average brokerage account, transactions amount to about EUR 35,000. These numbers are also consistent with that of Comdirect, one of the leading providers for online brokerage accounts in Germany, which reported in its Annual Report 2001 that the average brokerage account has about 11 transactions in a year, and the average transaction volume amounts to €3,000, giving a total average transaction volume per account of €30,000. With transaction fees of 1% this accounts to more than €300 per year.

[14] The publicly available Bundesbank statistic on brokerage accounts ("Statistische Sonderveröffentlichung 9, September 2004") reports for 2003 a total number of 3,455,000 retail brokerage accounts in large private banks. The total market value of holdings in these brokerage accounts amounts to €186,882 million. This implies an average value of €54,090 per brokerage account. At a percentage of 0.15% of market value this amounts to revenue of about €81 per year as an estimate of minimum fees per account, assuming no trading activity.

[15] This represents a substantial increase, as these banks had on average less than 1 million brokerage accounts in 1993.

4.3. Internal survey evidence from a sample bank

There are a large number of consulting studies done on cross-selling for banks in general. However, the kind of detail that we would like to have on how opening a single account affects other retail services is often unavailable. We were able to access a proprietary study done for a major bank in Germany that examines the amount of cross-selling that occurs through brokerage accounts.

Table 8 reports the study results and shows that brokerage accounts often lead to a significant amount of other accounts being opened with the bank. While these data are from a single bank, it is suggestive of the importance of a single account, here brokerage accounts, in cross-selling. Since brokerage accounts are often opened in conjunction with IPO applications, the results of this study underscore the importance of IPO activity to the bank's retail business.

4.4. Economic benefits to retail investors

A directly related question is whether the prospect of IPO allocations is attractive enough for retail investors to open up new brokerage accounts. Evidence for this can be obtained from two perspectives. First, anecdotal evidence through media reports suggests that retail investors are highly interested in IPO allocations. For example, *Stuttgarter Zeitung* quotes on April 1, 2000 a manager of BW-Bank, which was the lead bank for the TV-Loonland IPO: "Bidding tourism. … Buses full of stock tourists combined the visit to a branch of BW-Bank with a day trip to Stuttgart." So, by revealed action, retail customers do seem to be interested.

Table 8
Cross-selling impact of brokerage accounts
The table reports the product combinations that retail customers of the sample bank choose when they open a brokerage account with the sample bank. These figures refer to new customers in 1 calendar year during the sample period and only comprise those product combinations that are sold when the customer relation is initiated, but they exclude any product combinations that are sold subsequently.

Product combination	Number of new customers	Share (%)	Number of products
Brokerage account only	9.143	15.65	1.00
Brokerage account and savings account	18.034	30.87	2.00
Brokerage account and savings plan	6.730	11.52	2.00
Brokerage account and current account	6.479	11.09	2.00
Brokerage account, savings account, and savings plan	2.541	4.35	3.00
Brokerage account, current account, and savings plan	2.162	3.70	3.00
Brokerage account and other products	13.331	22.82	2.49*
Total	58.420	100.00	2.04

* Average of the combination of brokerage accounts and other products.

What is the potential economic gain to retail bidders? The average sample underpricing amounts to 25% and common allocation tranches for retail investors are around 100 shares. With an average offer price in our sample of about EUR 15, this implies that retail investors would have to pay EUR 1,500 and could gain EUR 375 by selling them immediately. This is attractive because (a) submitting an order is costless, and (b) the transaction requires no real investment if the shares are sold right away, as both purchase and sale are accounted for two days after the transaction. Hence, there are real gains to bidders from these allocations.

4.5. Growth in retail consumer loans

While brokerage accounts appear to be the first thing to examine in the context of IPOs, it is worth asking whether the bank's other retail services also experience a growth because of its underwriting activities. We do not have access to data on all services provided by the bank, but we were able to obtain aggregate consumer loans data from the Deutsche Bundesbank.

We test if the growth in retail consumer loans is related to the IPO activity of the bank. Once again, we want to control for other factors that might affect the growth of consumer loans so we control for banks' competitive lending and deposit rates and their growth. Table 9 shows that after controlling for these factors, the number of IPOs is significantly correlated with the growth in consumer loans. In columns 2 and 3, we include the number of SEOs and the number of underwritings, respectively, and find that SEOs do not have an impact, while underwritings—due to the number of IPOs—are positively related to the growth in retail consumer loans. In column 4 we control in addition for the growth in shareholder base, as well as for the hot period of 1999 and 2000. The number of IPOs underwritten by the bank continues to be highly significantly associated with the

Table 9
Multivariate analysis—growth in amount of retail consumer loans

The dependent variable is the growth in consumer loans. This is the yearly percentage change in the amount of loans to retail customers with a maturity of up to 5 years. These figures are calculated from the bank loan statistic (''Kreditnehmerstatistik'') at Deutsche Bundesbank. LNASSETS is the natural logarithm of bank assets. Growth in assets is the percentage change in assets between $t-1$ and t. Loan rate is the difference between the rate that a bank charges its retail customers for a loan with a value of less than DM 200,000/EUR 100,000 and the average rate across all banks for these loans. Deposit rate is the difference between the rate that a bank offers their customers for a 1-month deposit of less than DM 100,000/EUR 50,000 and the average rate across all banks for these deposits. Brokerage fees are from the *FINANZtest* publication and represent the yearly fees to be paid for a brokerage account with a volume of EUR 50,000 (as of March 2003). Number of (underpriced) IPOs is the number of (underpriced) IPOs for which a bank is the lead underwriter in a given year. Number of SEOs is the respective number for SEOs. Number of underwritings is the sum of Number of IPOs and Number of SEOs. Growth in shareholder base is the percentage change in the number of shareholders in Germany in a given year, as published by the DAI (Deutsches Aktieninstitut). Column 6 shows the first-stage regression for the IV estimations in cols 7 and 8. The standard errors in each column are adjusted for heteroskedasticity and time-clustering. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

	OLS estimation Growth in number of brokerage accounts (in %)					Number of IPOs	IV estimation Growth in number of brokerage accounts (in %)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	4.141	4.921	4.896	4.045	3.995	−3.477	4.454	4.764
	(2.35)**	(2.67)**	(2.56)**	(2.31)**	(2.11)**	(1.52)	(2.22)**	(2.32)**
LNASSETS	−0.197	−0.260	−0.263	−0.188	−0.186	0.211	−0.220	−0.232
	(2.20)**	(2.76)**	(2.56)**	(2.11)**	(1.89)*	(1.65)	(2.01)*	(2.15)**
Growth in assets	−1.675	−1.415	−0.936	−2.564	−2.732	2.188	−1.936	−2.865
	(0.66)	(0.59)	(0.47)	(1.04)	(1.12)	(1.05)	(0.72)	(1.03)
Loan rate	−0.146	−0.309	−0.281	−0.209	−0.246	−1.393	−0.229	−0.419
	(0.24)	(0.53)	(0.46)	(0.34)	(0.41)	(1.19)	(0.42)	(0.73)
Deposit rate	2.673	3.259	3.422	2.388	2.782	−4.709	2.772	2.837
	(0.83)	(0.96)	(0.95)	(0.76)	(0.74)	(1.17)	(0.85)	(0.80)
Brokerage fees	−0.023	−0.014	−0.008	−0.022	−0.208	0.003	−0.023	−0.023
	(1.53)	(0.93)	(0.56)	(1.51)	(1.36)	(0.11)	(1.63)	(1.57)
Number of IPOs	0.218	0.199		0.211			0.263	0.328
	(2.33)**	(2.16)**		(2.33)**			(2.31)**	(2.40)**
Number of SEOs		0.008						
		(0.68)						
Number of underwritings			0.099					
			(1.86)*					
Number of IPOs ($t-1$)						0.306		
						(4.02)***		
Growth in shareholder base				3.604	3.516	5.048		3.061
				(2.59)**	(2.67)**	(2.14)**		(2.17)**
= 1 if 1999 or 2000				−0.706	−0.573	2.135		−1.026
				(4.23)***	(2.97)**	(3.52)***		(3.94)***
Number of underpriced IPOs					0.250			
					(1.76)*			
Number of observations	122	122	122	122	122	122	122	122
R^2	0.18	0.22	0.20	0.22	0.22	0.49	0.18	0.19

growth of consumer loans. In column 5 we ask instead if the number of underpriced IPOs underwritten by the bank is significantly correlated to the growth of consumer loans. Replacing the number of IPOs with the number of underpriced IPOs, we find the coefficient on underpriced IPOs is bigger and continues to be very significant. We run a number of robustness checks. First, the IPOs tend to cluster in time, so we adjust the standard errors for time clustering as well as for heteroskedasticity. Second, we reestimate the regression using the one-period lagged IPO underwriting volume as an instrument along the spirit of Table 7. The first-stage regression is exactly the same as in Table 7 and shown in column 6. Again the results are very similar with the number of IPOs being positive and significantly related to the growth in retail consumer loans. These results, combined with the brokerage results, are consistent with IPO activity enabling the bank to obtain significant cross-selling for different products of the bank.

4.6. Corporate loans and IPO activity

We find that the amount of IPO underwriting is significantly related to the growth in brokerage accounts and retail consumer loans. We now conduct a slightly different test. If it is the case that the increase in different services comes from the general growth of the bank, then we should see this on all dimensions. As a control group we examine the growth in corporate loans. If it is indeed the case that increased IPO underwriting is a way to increase the cross-selling activities of retail services, then it is less likely to show up in corporate loans. As said before, the largest underwriting bank in Germany in this period underwrote 44 IPOs. This implies that cross-selling with corporate accounts is likely to be on a much smaller magnitude (maximum of 44 not excluding the fact that the bank is likely to already have a relationship with many of these corporate customers) than for retail accounts (where there are thousands of retail customers with no

Table 10
Multivariate analysis—growth in amount of corporate loans

The dependent variable is the growth in corporate loans. This is the yearly percentage change in the amount of loans to corporate borrowers with a maturity of up to 5 years. These figures are calculated from the bank loan statistic (“Kreditnehmerstatistik”) at Deutsche Bundesbank. LNASSETS is the natural logarithm of bank assets. Growth in assets is the percentage change in assets between $t-1$ and t. Loan rate is the difference between the rate that a bank charges its retail customers for a loan with a value of less than DM 200,000/EUR 100,000 and the average rate across all banks for these loans. Deposit rate is the difference between the rate that a bank offers their customers for a 1-month deposit of less than DM 100,000/EUR 50,000 and the average rate across all banks for these deposits. Brokerage fees are from the *FINANZtest* publication and represent the yearly fees to be paid for a brokerage account with a volume of EUR 50,000 (as of March 2003). Number of (underpriced) IPOs is the number of (underpriced) IPOs for which a bank is the lead underwriter in a given year. Number of SEOs is the respective number for SEOs. Number of underwritings is the sum of Number of IPOs and Number of SEOs. Growth in shareholder base is the percentage change in the number of shareholders in Germany in a given year, as published by the DAI (Deutsches Aktieninstitut). Column 6 shows the first-stage regression for the IV estimations in cols 7 and 8. The standard errors in each column are adjusted for heteroskedasticity and time-clustering. *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

	OLS estimation Growth in number of brokerage accounts (in %)					Number of IPOs	IV estimation Growth in number of brokerage accounts (in %)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.295	0.287	0.289	0.386	0.361	−3.477	0.355	0.445
	(0.77)	(0.65)	(0.66)	(1.08)	(0.98)	(1.52)	(0.75)	(0.90)
LNASSETS	−0.016	−0.015	−0.015	−0.021	−0.020	0.211	−0.020	−0.025
	(0.60)	(0.47)	(0.47)	(0.89)	(0.80)	(1.65)	(0.68)	(0.82)
Growth in assets	0.659	0.656	0.605	0.799	0.809	2.188	0.609	0.774
	(1.86)*	(1.78)*	(1.69)*	(2.58)**	(2.63)**	(1.05)	(1.22)	(2.30)**
Loan rate	−0.189	−0.190	−0.187	−0.167	−0.175	−1.393	−0.173	−0.150
	(0.55)	(0.53)	(0.52)	(0.48)	(0.49)	(1.19)	(0.57)	(0.48)
Deposit rate	−0.910	−0.992	−1.009	−0.849	−0.864	−4.709	−0.967	−0.811
	(0.20)	(1.40)	(1.43)	(1.03)	(1.06)	(1.17)	(1.31)	(1.00)
Brokerage fees	0.001	0.001	0.002	0.001	0.001	0.003	0.001	0.001
	(0.20)	(0.15)	(0.06)	(0.19)	(0.20)	(0.11)	(0.15)	(0.16)
Number of IPOs	−0.013	−0.012		0.004			−0.004	0.014
	(0.97)	(1.02)		(0.83)			(0.10)	(0.29)
Number of SEOs		−0.001						
		(0.08)						
Number of underwritings			−0.005					
			(0.62)					
Number of IPOs ($t-1$)						0.306		
						(4.02)***		
Growth in shareholder base				−0.598	−0.579	5.048		−0.642
				(0.83)	(0.79)	(2.14)**		(0.82)
= 1 if 1999 or 2000				−0.039	−0.028	2.135		−0.065
				(0.29)	(0.22)	(3.52)***		(0.42)
Number of underpriced IPOs					0.001			
					(0.01)			
Number of observations	122	122	122	122	122	122	122	122
R^2	0.03	0.03	0.03	0.04	0.04	0.49	0.03	0.04

prior business with the underwriting bank). The growth in the number of new brokerage accounts is likely coming from new clientele.

Table 10 is estimated using the growth in corporate loans as the dependent variable. Controlling for the same factors as before, we find that the number of IPOs is not significantly related to the growth of corporate loans. We reestimate this model using the same instrumental variable approach as before, for which the first-stage regression is shown in column 6. The results of the second-stage estimations in columns 7 and 8 are very similar to the OLS results. In all, the IPO underwriting activity of the bank is highly correlated with the growth in retail brokerage accounts and retail consumer loans and is not related to the growth in corporate loans.

5. Conclusion

Relationship banking is at the heart of the modern literature on financial intermediaries. Yet this literature has focused almost exclusively on bank–firm relationships. There is little understanding of the importance of retail banking relationships either for the bank or for the retail clientele. Understanding banks' incentives in retail banking relationships is clearly important in developing insight in the way banks behave and has implications for both academicians and regulators.

We are able to access proprietary data from multiple sources to assess the importance of retail banking relationships in a unique setting in which banks have retail depositors and also underwrite securities. Our data allow us to distinguish between the lead banks' own retail clientele and other retail clientele. We find very interesting differential patterns in demand between these two groups of retail clientele. We find the lead banks' retail clientele demand more of the underpriced issues and less of the overpriced issues as compared to other retail investors. We also find that the allocation of shares to both groups widely follows their demand patterns so that lead retail investors end up with better allocations. We investigate potential explanations for this by examining grey-market prices. We find that the differential demand between these two groups of retail clientele is significantly related to the difference between the actual underpricing and grey-market prices, i.e., the portion of underpricing that is over and above that seen in the grey-market. The evidence is consistent with banks' passing on private information about the issues to influence demand patterns of their own retail clientele to ensure that, even when their own retail and the retail clientele by other banks are allocated shares on a pro-rata basis, their own retail clientele do better than others.

We next ask why banks treat their retail customers well, as opposed to an alternative scenario in which banks pass on lemons to their retail depositors. Using data from the Bundesbank, we examine cross-selling as an explanation for retail banking relationships being important. We find evidence of banks benefiting from an increase in both brokerage accounts as well as other retail products such as retail loans, which are significantly related to increased IPO underwriting. We find brokerage accounts tend to be sticky and are maintained well after IPO underwriting activity declines. We quantify a lower bound on the economic benefits to the bank from such cross-selling and find the economic magnitude to be relatively large. Our results are robust to tests for a number of alternative stories.

Prior work in banking and the IPO literature often takes corporations or institutions to be the banks' "favored" clientele. Our evidence supports the importance of retail banking relationships, and suggests reasons to consider retail investors seriously as yet another favored clientele who are important to the bank. This is an interesting issue for future research to examine on theoretical as well as on empirical dimensions.

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