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Purchasing IPOs with Commissions

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Abstract

We find direct evidence that institutions increase round-trip stock trades, increase average commissions per share, and pay unusually high commissions on some trades in order to send abnormally high commissions to the lead underwriters of profitable initial public offerings (IPOs). These excess commission payments are a particularly effective way for transient investors to receive lucrative IPO allocations. Our results suggest that the underwriter's concern for their long-term client relationships limits the payment-for-IPO practice. We estimate that abnormal commission payments are large for the most profitable issues, and that an additional $1 excess commission payment to the lead underwriter results in $2.21 in investor profits from allocated shares.

I. Introduction

Institutional investors are justifiably interested in receiving initial public offering (IPO) allocations given the historical profitability of these positions. The 1,555 firms that went public from 1999 to 2005 left more than $82 billion on the table.[1] Since lead underwriters have significant discretion in allocating shares when bookbuilding is used, much of the lobbying by institutional investors is likely directed toward the lead underwriter.[2] Existing academic theories seeking

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[1]Money left on the table is defined as the difference between the 1st-day closing price and the offer price times the number of shares offered as in Loughran and Ritter (2002). We obtain information for the total dollar value of money left on the table from Jay Ritter's Web site: http://bear.cba.ufl.edu/ritter/Moneybyyear.pdf. We thank Jay Ritter for providing this data.

[2]Boehmer, Boehmer, and Fishe (2006) find that the lead underwriter is responsible for allocating approximately 75% of the total number of shares offered.

to explain the allocation decisions of underwriters suggest that underwriters receive tangible or intangible benefits in return for allocating shares to certain investors. For example, Benveniste and Spindt (1989) suggest that IPO allocations encourage privately informed investors to reveal their information to the lead underwriter. While this intangible benefit might be a factor in allocation decisions, it is also possible that underwriters allocate IPO shares to investors who provide them with more tangible benefits. According to the agency view advocated by Loughran and Ritter (2002), (2004), investors will engage in rent-seeking behavior, such as sending trading commissions to the underwriter's brokerage arm, to increase their probability of being allocated profitable IPO shares.

Recent survey evidence by Jenkinson and Jones (2009) raises doubts concerning the extent of information production by institutional investors in the IPO process, and instead provides support for the agency view. Both large and small institutions responding to their survey indicate that brokerage commissions paid to the underwriter are the most important determinant in receiving IPO allocations. Similarly, documents from the National Association of Securities Dealers (NASD) report that Robertson Stephens used an index, ranking investors by commissions paid over the previous 18 months, to decide who would receive profitable IPO allocations.[3] This evidence is consistent with empirical findings by Goldstein, Irvine, Kandel, and Wiener (2009), who suggest that institutions concentrate their trading with particular brokerage firms and in return, receive preferential treatment with regard to brokerage services.

The purpose of this study is to investigate the relationship between trading commissions and IPO allocations directly. We are aware of only 2 other studies that attempt to investigate this relationship, albeit less directly. Using semiannual mutual fund reports, Reuter (2006) finds a positive correlation between the commissions paid to an underwriter and a mutual fund family's holdings of recent profitable IPOs from that same underwriter. His findings suggest that lead underwriters allocate profitable IPOs to investors who provide a stable stream of commission revenue. Alternatively, Nimalendran, Ritter, and Zhang (NRZ) (2007) find some evidence that aggregate trading volume in the 50 most liquid stocks is related to subsequent money left on the table. They suggest that transient investors are churning stocks in the period immediately preceding the IPO in order to send commissions to the lead underwriter.[4] The stable and transient investor views of IPO allocation contracting are paradoxical, since 2 distinct investor groups receive preference in IPO allocations.[5] In addition, both studies are constrained by

[3]According to the Securities and Exchange Commission (SEC), the allocation of IPO shares based on past or expected future commission business is legal. However, lead underwriters are restricted from sharing in any client profits that may result from underpricing. See Letter of Acceptance, Waiver, and Consent sent to the NASD (no. CAF030001).

[4]NRZ (2007) do not have information on trading commissions or the brokerage firm involved in each trade; thus, inference concerning the behavior of transient investors is circumstantial.

[5]For clarity, we refer to stable and transient investor groups using different methods to pay for IPO allocation. In our paper, these investor groups refer to 2 distinct implicit contracts: a stable long-term commission payment and a transient spot payment at the time of IPO issuance. We find that stable clients tend to use the long-term commission payment and transient clients tend to use the spot contract, but the contracts are not mutually exclusive, and both types of investors could use both methods of payment to a greater or lesser extent.

both IPO allocation and commission data limitations. In this paper, we reconcile Reuter's stable investor view with NRZ's transient investor evidence, and provide new and more detailed evidence of commission payments for IPO allocations using a proprietary database of institutional trades.

Our paper makes several distinct contributions to the existing literature. First, we describe a world where stable and transient investors coexist and make payments to underwriters for IPO allocations. Second, we are the first to provide direct evidence of excess lead-underwriter commission revenues in the period immediately preceding the most profitable IPOs. Third, we expand on NRZ's (2007) churning conjecture by examining the distinct trading strategies (e.g., abnormal round-trip trading or paying unusually high commissions on some trades) that institutions might use to increase the commissions they pay to lead underwriters. Fourth, we find that inflated commission payments depend on lead-underwriter characteristics, such as the concentration of its client base. Finally, we use our unique data set to show that institutions are successful in using commissions to capture IPO profits.

We begin our empirical investigation by dividing IPOs each year into quartiles based on the amount of money left on the table. Using an event study methodology, we find significant increases in lead-underwriter commission revenue for the 2 most profitable IPO quartiles. We find that these excess commissions are concentrated in the 10-day period immediately preceding the IPO offer date. Postissue commission payments in return for IPO allocations appear to be concentrated with one subsequently prosecuted brokerage firm rather than a general phenomenon.[6] Our results are consistent with strategic decisions by transient investors to use commission dollars as a means of obtaining profitable IPO allocations. We confirm that these findings are robust to a variety of alternate specifications and cannot be attributed to marketwide changes in trading volume or the clustering of IPO issuance.

The economic significance of our finding is also important. When compared to the nonevent benchmark level of commissions, the average lead underwriter experiences an 8.49% increase in commission revenues during the 10-day period immediately preceding the most profitable IPOs. Overall, for the 2 most profitable IPO quartiles, this translates to $93.53 million in excess lead-underwriter commissions that are paid by our sample of institutions. Since our data represent only 7.97% of Center for Research in Security Prices (CRSP) daily share volume, our estimate clearly understates the magnitude of marketwide excess commissions received by lead underwriters.

We next investigate trading strategies that institutions might use to increase commissions paid to lead underwriters. Institutions might simply reallocate "normal" trading volume to a lead underwriter with an upcoming IPO. Alternatively, institutions might inflate the commission revenues that they pay to lead

[6]The SEC strictly prohibits ex post profit sharing, such as the ex post risk-sharing contract in Brennan and Chordia (1993). In 2002 the SEC charged Credit Suisse First Boston (CSFB) with receiving kickbacks in the form of inflated commissions from clients who received profitable IPO allocations. The SEC claimed that several of CSFB's institutional clients kicked back up to 65% of the IPO profits to the brokerage in the form of excessive commissions.

underwriters by churning stocks, increasing the average commission per share paid, or paying unusually high commissions for some trades. These choices are not mutually exclusive; in fact, we find that many of these strategies are used by institutions in our sample. We estimate that commissions from abnormal round-trip trades account for 11% of the total increase in commission revenue for the most profitable IPO quartile.

We also test whether transient investor commission payments are related to characteristics of the lead underwriter. Using a multivariate regression, we find that transient investor excess commission payments are positively related to underwriter reputation, and decrease as the underwriter's commission revenues become concentrated with particular stable clients. Our finding is consistent with the conjecture that stable investors' long-term relationships with lead underwriters inhibit the underwriter's willingness to accept transient investor payments. Thus, stable relationships keep excess commission activity small relative to the potential IPO profits available.

Finally, our data allow us to examine whether institutions are successful in using commissions to capture IPO profits. Specifically, we investigate whether excess commissions sent to the lead underwriter result in larger allocations of profitable IPOs. Since IPO allocations are not available in our data, we proxy for these allocations by examining net IPO selling by each institution in the 365 calendar days after the offer date. Notably, we find that transient institutions interact somewhat differently with lead underwriters than do stable institutions. IPO allocations to stable institutions are primarily determined by the long-term commission revenue streams that these institutions provide. Alternatively, excess commissions sent to the lead underwriter in the period immediately preceding the IPO are more important for transient investor allocations. We estimate that $1 of abnormal commission revenue sent by transient institutions to the lead underwriter generates $2.21 in IPO profits from allocated shares. It is clear that transient institutions are successful in using commissions to capture excess IPO profits.

In the next section, we discuss the interaction between underwriters and their clients. Section III presents our data, and Section IV presents the main empirical results of our investigation. Section V examines trading strategies that institutions might employ to increase commission payments. Section VI examines the determinants of abnormal commissions, including client concentration, IPO profitability, and lead-underwriter reputation. Section VII examines the relation between abnormal commissions and IPO allocations more directly using data on post-IPO sales. Section VIII concludes.

II. Investors, Underwriters, and Commission Payments Prior to an IPO

Benveniste and Spindt (1989) and others develop models using information asymmetry to explain the IPO bookbuilding process. While information revelation might be a determinant in underwriters' allocation decisions, it is also probable that, as noted by Jenkinson and Jones (2009) and Loughran and Ritter (2002), (2004), quid pro quo commission arrangements are of principal importance in the allocation process.

Prior literature suggests that there are stable institutional clients who pay a regular stream of commission dollars to the underwriter. As in Reuter (2006), Binay, Gatchev, and Pirinsky (2007), and Goldstein et al. (2009), these investors enter into implicit long-term contracts where they agree to pay premium commissions (relative to electronic communication network (ECN) execution) and, in return, expect to receive premium services, including allocations of desirable IPOs. Alternatively, there might also be transient investors who attempt to buy their way into IPO allocations by directing abnormally high commissions to the underwriter in the period immediately surrounding a desirable IPO, as suggested by NRZ (2007).

Both stable and transient investor types use commission business to compete for the underwriter's attention. Given a limited supply of shares to allocate, the underwriter faces a trade-off. The underwriter may allocate all shares to stable clients, or it may allocate some shares to transient investors and receive additional commission revenues. Any allocation to transient investors reduces the welfare of stable investors, and if detected, stable investors might punish the underwriter by withholding future commission business. Therefore, the underwriter will only allocate shares to transient investors if the additional commissions it receives (which are positively related to expected IPO profitability) are large enough to offset the potential losses from being caught and punished by stable investors.

Our conjecture of how underwriters allocate IPO shares across stable and transient clients provides a number of testable empirical hypotheses. Our 1st hypothesis follows:

Hypothesis 1. The lead underwriter receives increased commission revenues in the period immediately surrounding the IPO that are increasing in the IPO's expected profitability.

When transient investors exist, we should observe elevated lead-underwriter commission revenues as investors compete for lucrative IPO allocations. As the expected profitability of IPO allocations increases, we should observe an increase in this type of rent-seeking behavior.

We also suggest that the composition of the underwriter's client base has implications for underwriter allocation decisions. Specifically, Hypothesis 2 states:

Hypothesis 2. The likelihood that an underwriter accepts increased commission payments in the period immediately surrounding an IPO is a decreasing function of the concentration of the underwriter's client base.

If stable clients discover the lead underwriter allocating lucrative IPO shares to transient investors, they might punish the lead underwriter by withholding future commission business. Thus, underwriters with a more concentrated base of stable investors will find it more costly if any one client decides to withhold future commission business.[7] Empirically, we expect fewer excess commission payments to this type of underwriter.

[7] Since large clients comprise a significant fraction of bookbuilding demand, they might have better information about total demand for the issue, and are therefore better able to detect allocations to transient institutions.

The final hypotheses test our key assumptions about stable and transient investor behavior in the IPO market.

Hypothesis 3. Increased commission payments in the period immediately surrounding the IPO affect allocations to transient investors more than those to stable investors.

Hypothesis 4. Stable investors receive the majority of an underwriter's IPO allocations.

Hypotheses 2, 3, and 4 are unique to our paper; they are contained in neither Reuter (2006) nor NRZ (2007). In the next section, we describe the data used to test these hypotheses empirically.

III. Data and Methodology

A. Trading Data

We obtain institutional trading data from Ancerno Ltd. (formerly the Abel/Noser Corporation), a widely recognized consulting firm that works with institutional investors to monitor their equity trading costs.[8] Ancerno clients include pension plan sponsors such as the California Public Employees' Retirement System (CalPERS), the Commonwealth of Virginia, and the Young Men's Christian Association (YMCA) retirement fund, as well as money managers such as Massachusetts Financial Services (MFS), Putnam Investments, and Lazard Asset Management. The Ancerno sample contains trades from 840 institutions and covers the 7-year period from January 1, 1999 until December 31, 2005.

Summary statistics for the more than 87 million institutional trade executions in the Ancerno database are presented in Panel A of Table 1. For each execution, Ancerno provides the institution identity code, identity of the broker/dealer handling the execution, date, stock traded, number of shares executed, execution price, whether the execution is a buy or sell, and commissions paid. While the name of the institution is not provided, the unique identity codes allow us to distinguish between different institutions' trades both in the cross section and through time.[9] The average number of shares per execution varies from 6,669 in 2005 to 11,159 in 2001, while commissions per execution range from $176 in 2005 to $428 in 2002. Over the entire sample period, Ancerno clients trade more than 755 billion shares worth $22.9 trillion and pay more than $24.6 billion in commissions. On average, institutions in the sample are responsible for

[8]Ancerno provides consulting services for equity trading costs in a manner similar to the Plexus Group, whose data have been used extensively in academic studies. Other studies that have used Ancerno data include Chemmanur, He, and Hu (2009), Lipson and Puckett (2007), and Goldstein et al. (2009). We thank Ancerno for providing the data, and we thank Eugene Noser and Judy Maiorca of Ancerno for answering many detailed questions about the data.

[9]Ancerno receives trading data directly from the order delivery system (ODS) of all money manager clients, and therefore includes all trades executed by money managers. The method of data delivery for pension plan sponsors also includes all executed trades.

TABLE 1

Summary Statistics

Panel A of Table 1 presents descriptive statistics for the Ancerno institutional trading data. The trades in the sample are placed by 840 different institutional clients of Ancerno during the time period from January 1, 1999 to December 31, 2005. Trades refers to executions of orders placed by institutions in the database. Panel B presents summary statistics for the 1,156 sample IPOs with offer dates between March 31, 1999 and October 1, 2005. IPOs are divided into quartiles each year based on the variable MONEY, which is the difference between the 1st-day closing price and the offer price times the number of shares offered. UNDERPRICING is the gross return on the 1st day of issue calculated as the (1st-day closing price – offer price) divided by the offer price; OFFER_SIZE is the dollar size of the IPO offered (measured as the number of shares offered times the offer price); HERFINDAHL is the mean Herfindahl calculated for each IPO-lead underwriter and captures the concentration of trading volume across all institutional clients of the broker for the [–270, –21] trading day period; LEAD_BROKER_SIZE is the average daily commissions executed through the issuing broker over the [–60 to +60] period surrounding the IPO issue date; and CLIENT_SIZE ($thousands) is the average dollar value of trading volume for each IPO-lead underwriter combination during the [–270, –21] period, first averaged across all clients for a particular IPO-lead underwriter observation, and then averaged across all IPOs. Summary statistics presented in Panel B are mean values.

	Year of Observations						
	1999	2000	2001	2002	2003	2004	2005
Panel A. Ancerno Data							
No. of institutions	382	376	404	430	405	406	376
No. of stocks	6,150	5,906	5,082	4,692	4,736	4,927	4,763
No. of trades (millions)	5.64	7.56	9.05	12.32	12.35	21.43	19.10
Share volume (billions)	50.69	73.44	100.99	135.04	112.30	155.92	127.40
Dollar volume ($trillion)	2.25	3.20	3.06	3.23	2.76	4.46	3.95
Commissions ($million)	1,751	2,147	2,905	5,273	3,667	5,571	3,361
Mean shr. volume/trade	8,988	9,714	11,159	10,961	9,093	7,276	6,669
Median shr. volume/trade	1,700	1,500	1,400	1,300	1,050	700	453
Mean $ volume/trade	398,803	423,726	337,633	262,359	223,126	208,027	206,902
Median $ volume/trade	60,030	54,970	39,200	30,300	27,297	20,568	14,232
Mean $ commission/trade	310	284	321	428	297	260	176
Median $ commission/trade	25	20	21	40	20	17	8
Panel B. IPO Data							
All IPOs							
No. of IPOs	368	319	69	64	65	160	111
MONEY ($thousands)	73,918	67,335	38,068	17,341	17,854	18,072	–5,175
UNDERPRICING (%)	74.12	56.80	14.65	8.67	12.42	11.23	12.92
OFFER_SIZE ($thousands)	117,566	147,827	378,477	292,636	154,302	195,164	181,748
HERFINDAHL	0.177	0.179	0.174	0.117	0.123	0.135	0.153
LEAD_BROKER_SIZE ($)	211,065	267,818	473,843	756,161	591,706	467,976	448,695
CLIENT_SIZE ($thousands)	119,349	223,883	299,250	238,399	219,211	253,406	236,171
Quartile 4 (high MONEY)							
MONEY ($thousands)	235,449	229,036	127,788	68,795	53,263	82,596	60,523
UNDERPRICING (%)	192.94	161.13	25.10	23.34	26.12	31.73	62.14
OFFER_SIZE ($thousands)	262,395	309,656	1,150,152	573,504	238,159	355,989	209,109
Quartile 3							
MONEY ($thousands)	49,464	39,228	24,192	15,400	19,031	14,112	12,077
UNDERPRICING (%)	78.69	53.41	27.04	14.12	21.25	16.54	12.44
OFFER_SIZE ($thousands)	78,488	115,580	105,608	122,854	121,955	117,677	149,962
Quartile 2							
MONEY ($thousands)	13,097	9,957	6,752	1,183	4,895	1,897	600
UNDERPRICING (%)	28.35	19.05	9.95	3.10	6.55	4.26	2.84
OFFER_SIZE ($thousands)	63,260	60,436	95,142	86,505	128,912	64,298	86,528
Quartile 1 (low MONEY)							
MONEY ($thousands)	–2,335	–6,861	–4,619	–16,014	–4,961	–23,752	–91,558
UNDERPRICING (%)	–3.50	–5.10	–3.23	–5.87	–3.84	–6.52	–23.97
OFFER_SIZE ($thousands)	66,123	107,658	179,673	387,681	129,771	226,473	282,372

at least 7.97% of total CRSP daily dollar volume during the 1999–2005 sample period.[10]

[10]We calculate the ratio of Ancerno trading volume to CRSP trading volume during each day of the sample period. We include only stocks with sharecode equal to 10 or 11 in our calculation. In addition, we divide all Ancerno trading volume by 2, since each individual Ancerno client constitutes only one side of a trade. We believe this estimate represents an approximate lower bound for the size of the

In untabulated results, we aggregate trading by brokerage firm (or ECN) and investigate commission revenues. All 10 of the largest brokers (ranked by average commission revenues per day) also underwrite IPOs during our sample period. Merrill Lynch is the largest broker, earning an average of $873,388 in commissions each trading day. The 10th largest broker is J.P. Morgan, which earns an average of $362,881 per day in commission revenues.

B. IPO Data

We use the Securities Data Company's (SDC) new issues database to identify IPOs from March 31, 1999 to October 1, 2005, and the CRSP database to obtain 1st-day closing prices for each IPO firm.[11] We exclude all American Depositary Receipts (ADRs), real estate investment trusts (REITs), unit investment trusts, closed-end funds, and IPOs with an offer price of less than $5. Our filters leave us with a sample of 1,183 IPOs. Finally, we require that the lead underwriter is a broker in the Ancerno database, which eliminates 27 IPOs and leaves us with a final sample of 1,156 IPOs involving 88 different lead underwriters.

Following Loughran and Ritter (2002), we calculate money left on the table (MONEY) for each IPO as the 1st-day closing price minus the offer price multiplied by the number of shares offered. As such, MONEY represents the total 1st-day IPO profits available to investors. From Hypothesis 1, we expect excess commissions paid to the lead underwriter around the IPO offer date to be positively related to MONEY. To examine this prediction, we rank IPOs in each year by MONEY and separate the sample into quartiles.[12]

Summary statistics for each MONEY quartile in each year are presented in Panel B of Table 1. IPOs in the highest MONEY quartile (quartile = 4) present investors with average potential 1st-day profits between $235 million (in 1999) and $53 million (in 2003). Money left on the table for the highest quartile is generally 5 or 6 times the average 1st-day profits for quartile 3, which varies from $49 million in 1999 to $12 million in 2005. MONEY averages for quartile 2 are generally a few million dollars, while MONEY averages for the lowest quartile (quartile = 1) are uniformly negative. IPO profitability is, of course, highly correlated with underpricing, which ranges from over 100% in the highest MONEY quartile during the Internet bubble period to a low of –24% in the lowest MONEY quartile in 2005. The extremely profitable IPOs in the 2 highest quartiles (quartiles 3 and 4) appear large enough to entice some institutions to attempt to purchase IPO allocations with excess commission payments. We next investigate whether the empirical evidence supports this hypothesis.

Ancerno database, as it functionally assumes that all trades in our sample had Ancerno clients on both sides of each trade.

[11]Although our Ancerno trading data span from January 1, 1999 to December 31, 2005, we require 60 days of institutional trading data before and after all IPO offer dates in order to calculate expected levels of commission revenue for each broker. We also check Jay Ritter's IPO Web site (http://bear.cba.ufl.edu/ritter/ipodata.htm) for possible SDC data errors and for the SDC data errors mentioned in footnote 4 of Ljungqvist and Wilhelm (2003); see http://pages.stern.nyu.edu/∼aljungqv/.

[12]In unreported results, we pool IPOs across all years and then sort by MONEY quartile. Results using this alternate sorting procedure are similar to those reported in the paper.

IV. Main Results

A. Event Study

We first use an event study to examine the existence and timing of excess lead-underwriter commission revenues. For each IPO, we collect all trades executed by the lead underwriter during the [–60, +60] trading day period surrounding the IPO offer date and calculate total commission revenue earned each day. For each MONEY quartile, we compute the average commission revenue for each day in this time series.[13] As a basis for our statistical tests, we create a benchmark level of mean daily lead-underwriter commission revenue during the [–60, –21] and [+21, +60] nonevent period. We then compare the average daily event-period commission revenue to the benchmark level using the standard deviation of commission revenues in both the benchmark and event periods to construct our test statistic.[14]

Since prior literature provides little guidance regarding the timing of abnormal commission payments, the timing of abnormal commissions is itself an empirical question. Our initial investigation examines four 10-day event periods surrounding the offer date: [–20, 11], [–10, –1], [1, 10], and [11, 20]. Our investigation of excess commission payments in the preoffer period (event periods [–20, –11] and [–10, –1]) relies on the assumption that institutions have the ability to forecast which IPOs will leave large amounts of money on the table. We find significant support for this assumption even though the IPO offer price is not typically finalized until the day before the offer date. The "partial adjustment" literature (see Hanley (1993)) and our discussions with institutional investors both substantiate our assumption that information available in the preoffer period gives institutions the ability to forecast which IPOs will leave large amounts of money on the table.[15] Because of the well-documented increase in trading activity that occurs on the offer date, the offer date itself is omitted in tests for abnormal commissions.[16]

Table 2 presents our event study results for abnormal commissions. We reiterate that our tests evaluate commissions paid to the lead underwriter only. Our findings suggest that some investors increase commissions sent to the lead underwriter in the period immediately preceding the most profitable IPOs. We also find some evidence of decreases in lead-underwriter commission revenue

[13]In unreported tests, we separate the IPO sample into quartiles based on UNDERPRICING and repeat the event study with similar results.

[14]The benchmarking methodology is identical to that used in Corwin, Harris, and Lipson (2004) and Irvine, Lipson, and Puckett (2007).

[15]NRZ (2007) analyze the prediction of 1st-day IPO returns by an industry newsletter (The IPO Reporter) and conclude that institutions are able to predict which IPOs would leave large amounts of money on the table.

[16]We examine separately whether commission revenue on the offer date (excluding IPO trading) is significantly different than nonevent-period commission revenue. We find that abnormal commission revenues are positive and statistically significant for quartile 4 (high MONEY) and quartile 3, but are insignificantly different from 0 for quartiles 1 and 2. As these results are similar to and supportive of those found in our main results, we do not include them in our tabulated results.

TABLE 2

Lead-Underwriter Commission Revenue around IPO Issuance

Table 2 presents event study results for abnormal commissions received by lead underwriters around the IPO offer date. Our sample contains 1,156 IPOs with offer dates between March 31, 1999 and October 1, 2005. IPOs are divided into quartiles each year based on the variable MONEY, which is the difference between the 1st-day closing price and the offer price times the number of shares offered. We report the average daily commissions received by the lead underwriter during the nonevent period, which is the period [–60, –21] and [+21, +60] surrounding the IPO offer date (event day 0). We then present the average abnormal daily commission revenue (event-period commissions per day minus nonevent-period commissions per day) for 4 event periods surrounding the IPO offer date: [–20, –11], [–10, –1], [+1, +10], and [+11, +20]. We separate the sample of IPOs into the bubble period (1999 to 2001) and nonbubble period (2002–2005) and repeat our analysis of abnormal commissions for the event period [–10, –1]. *t*-statistics are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. **Bold** indicates a statistically positive difference, and *italics* indicate a statistically negative difference.

	(low MONEY) Quartile 1	Quartile 2	Quartile 3	(high MONEY) Quartile 4
Panel A. All Periods (1999–2005)				
No. of IPOs	290	290	289	287
Nonevent (commissions/day)	305,293	291,310	347,756	456,272
Abnormal (commissions/day)				
[–20, –11]	5,899	*–13,268***	3,184	–427
	(1.02)	(–2.40)	(0.56)	(–0.07)
[–10, –1]	5,030	–7,228	**10,167***	**22,351*****
	(0.82)	(–1.30)	(1.71)	(4.14)
[+1, +10]	–6,877	*–18,235****	266	–8,724
	(–0.96)	(–3.01)	(0.08)	(–0.95)
[+11, +20]	–8,261	*–12,916**	9,233	5,937
	(–1.29)	(–1.76)	(1.63)	(1.03)
Panel B. Bubble Period (1999–2001)				
No. of IPOs	189	190	189	188
Nonevent (commissions/day)	207,136	231,250	261,831	332,360
Abnormal (commissions/day)				
[–10, –1]	1,325	–1,269	1,874	**14,803*****
	(0.27)	(–0.38)	(0.35)	(3.52)
Panel C. Nonbubble Period (2002–2005)				
No. of IPOs	101	100	100	99
Nonevent (commissions/day)	481,576	403,213	501,891	697,818
Abnormal (commissions/day)				
[–10, –1]	11,682	*–18,332**	**25,044****	**36,591****
	(1.42)	(–1.95)	(2.12)	(2.33)

around the least profitable IPOs.[17] For the most profitable MONEY quartile, the average lead underwriter receives $456,272 in commissions per day during the nonevent benchmark period, and this amount increases by $22,351 per day ($t$-statistic = 4.14) during the [–10, –1] event period. This 5% increase *per day* cumulates to $223,510 over the [–10, –1] period, or about another half day's worth of commissions. For quartile 3, the increase in lead-underwriter commissions during the [–10, –1] event period is $10,167 per day ($t$-statistic = 1.71). Our initial

[17]The most intriguing explanation of these results is that they represent institutions that punish lead underwriters for underperforming IPOs. However, there are two arguments against this explanation. First, quartile 2 IPOs are still profitable on average (Panel B of Table 1), although ex ante uncertainty concerning future IPO profitability might have caused clients to focus on other opportunities. Second, and more notably, these results are not robust to the alternative difference-of-differences test design presented in Table 4.

results support Hypothesis 1: Excess commission payments exist and are increasing in the expected profitability of the IPO.[18]

Our findings suggest that excess commission payments do not occur until just before the IPO—specifically, in the 2 weeks [–10, –1] prior to the IPO offer date. Jenkinson and Jones (2009) suggest that both investors and the underwriter interact at the roadshow and in private conversations prior to the IPO offer date, and that in doing so, investors can gauge the interest level of other investors. For example, experienced institutional clients who are privy to the broker's pre-IPO roadshow can gather information about latent demand for the IPO simply by observing the crowd at these presentations. At the same time, the process of sending excess commissions must be commenced early enough to allow these excess commissions to accumulate. Therefore, an institution wishing to send excess commissions to an underwriter must trade off the amount of time it will take to amass notable excess commissions against the uncertainty that can be resolved, in part, by waiting. Our empirical findings indicate that institutions begin this process about 2 weeks prior to the IPO.

NRZ (2007) present circumstantial evidence that these abnormal commission payments are observable only during the bubble period. To investigate this possibility, we divide our sample into bubble (1999–2001) and nonbubble (2002–2005) periods and repeat our analysis for both subperiods. For expositional convenience, we report only abnormal commissions during the [–10, –1] event period for these subperiods in Table 2.[19] Abnormal lead-underwriter commissions are $14,803 per day ($t$-statistic = 3.52) for quartile 4 IPOs during the bubble period and $36,591 ($t$-statistic = 2.33) in the nonbubble period. Controlling for the increase in overall commissions paid over our sample period, we find that in both bubble and nonbubble periods the abnormal lead-underwriter commissions are about 5% more than the benchmark level.[20] For quartile 3 IPOs, there are some differences between the time periods. Event-period commissions for quartile 3 are not significantly different than benchmark levels during the bubble period, but during the nonbubble period abnormal commissions are $25,044 ($t$-statistic = 2.12) per day. Our results suggest that abnormal commission payments exist in both the bubble and nonbubble periods, and that in each case institutions pay approximately 5% more immediately prior to the offer date.

[18]We find no evidence of abnormal ex post commission payments for quartiles 3 and 4. In separate tests, we analyze CSFB alone, since CSFB is an active underwriter specifically cited in SEC documents alleging ex post settling-up behavior. In the CSFB-only sample, we find evidence of significant abnormal commission payments in the [+1, +5] period after the IPO offer date for both quartiles 3 and 4 during the bubble period. By extrapolating our volume data to CRSP total volume levels, we estimate that over $46.7 million in excess commissions were received by CSFB in this period. Our estimates are consistent with the magnitude of SEC litigation release 17327 claiming $70 million in improper gains that CSFB was ordered to disgorge.

[19]In robustness tests, we define the bubble period subsample as 1999 to 2000 and find results similar to those reported in Table 2.

[20]There are two primary reasons why average daily nonevent-period commissions increased significantly between the bubble and nonbubble periods. First, the aggregate level of trading activity is increasing over our sample period for both the overall market and for our sample of Ancerno institutions. Second, and perhaps more importantly, trades on NASDAQ-listed stocks were generally not charged explicit commissions prior to 2002, but as a result of decimalization, commissions were charged on more than 90% of the trades for NASDAQ-listed stocks from 2002 onward.

The economic value of these inflated commissions is significant. As noted previously, our estimates suggest that 10-day lead-underwriter excess commission revenue per IPO is $223,510 for IPOs in quartile 4 and $101,670 for IPOs in quartile 3. Overall, for the 2 most profitable IPO quartiles, this translates to $93.58 million in excess lead-underwriter commissions that are paid by our sample of institutions. However, our data represent only 7.97% of CRSP daily share volume and therefore clearly understate the magnitude of marketwide excess commissions received by lead underwriters. Assuming that institutions account for 70% of CRSP trading volume and that institutions outside of our sample act in a manner similar to the institutions in our sample, we estimate total marketwide abnormal commissions of $1,963,065 ($892,957) per IPO for lead underwriters of quartile 4 (quartile 3) IPOs.[21] With 576 IPOs in quartiles 3 and 4, our estimate of aggregate marketwide abnormal commissions received by lead underwriters is $821 million.

The economic magnitude of this revenue is still small relative to the $58 billion left on the table by these IPOs. It is puzzling why even higher abnormal commissions are not observed given the large profits available. Chen and Ritter (2000) note that profit-maximizing underwriters would be better served by raising the offer price of the IPO and capturing 7% of any additional proceeds in the form of underwriting fees. However, this argument ignores externalities surrounding underpricing and allocation decisions including extracting valuable information from informed investors (Benveniste and Spindt (1989)), managing litigation risks (Tinic (1988), Lowry and Shu (2002)), and the long-term nature of broker-client contracts (Goldstein et al. (2009)).

It is notable that we do not observe positive abnormal commissions for quartile 2 IPOs, which are profitable ex post. The results suggest that expected profits must be large to engender transient investors to offer commission payments to obtain allocations, especially considering the uncertainty of IPO profitability. Only when IPO profits are expected to be extremely large can transient investors justify a large enough extra payment to induce lead underwriters to allocate shares away from their stable clients.

B. Robustness Tests

Event study results in Table 2 indicate that for the most profitable IPOs, lead underwriters receive increased commission revenues during the 10-day period immediately preceding the offer date. However, prior research reports that IPO activity is both clustered in calendar time and is related to aggregate market activity (Lowry (2003)). We investigate the potential effects of these facts in 2 robustness tests.

1. Calendar-Time Regressions

If IPO events are clustered in calendar time, our event study might suffer from correlated errors and a tendency to overreject the null. Although many prior

[21]Our assumption that institutions account for 70% of CRSP trading volume is consistent with estimates by Schwartz and Shapiro (1992) and Jones and Lipson (2004).

studies document IPO clustering in hot markets (e.g., Ritter and Welch (2002)), we reiterate that our analysis investigates lead-underwriter commission revenues only, thus mitigating the clustering problem.

When pooling all IPOs in our sample across all lead underwriters, we find that IPOs are extremely clustered. Of the 1,156 IPOs in our sample, 1,147 of them occur within 10 days of another IPO, and only 9 do not. However, when we view our sample IPOs separately for each lead underwriter, we find 467 IPOs for which the lead underwriter did not serve as the lead underwriter on *any* other IPO during the [–10, +10] period. Since we are examining IPOs based on lead-underwriter commissions only, which condition on the lead underwriter, the clustering in our analysis is substantially reduced.

Although our unit of analysis clearly reduces the clustering problem, it is not eliminated completely. To address this issue, we employ a calendar-time regression approach. We proceed as follows: We aggregate commissions and money left on the table separately for each underwriter on each day of the sample period. We then specify the underwriters' daily commission revenue as a function of future money left on the table (MONEY):

$$(1)\quad \text{COMMISSIONS}_{t,j} = \alpha + \beta_1\left(\sum_{n=1}^{5,10}\text{MONEY}_{t+n,j}\right) + \sum_{n=1}^{4}\gamma_k\text{COMMISSIONS}_{t-n,j} + \beta_2\left|\text{MKTRET}_t\right| + \sum_{m=2}^{84}\delta_m\text{MONTH}_m + \varepsilon_t.$$

The dependent variable in equation (1) is the commission revenue received on day t by lead underwriter j. The independent variable of interest, MONEY, is the aggregate amount of money left on the table by underwriter j, summed over days $t+1$ through $t+5$ (or $t+1$ through $t+10$). We include 4 lags of the COMMISSIONS variable to control for daily autocorrelation in the level of underwriter commissions (see NRZ (2007)) and the absolute value of the CRSP equal-weighted return ($|\text{MKTRET}_t|$), since institutional volume is higher during large market movements (Dennis and Strickland (2002)). Finally, we include month fixed effects (MONTH) to control for any time-series changes in the frequency of trading in our data. We adjust all t-statistics using Newey-West (1987) standard errors.

Table 3 presents the results of these regressions for the full sample as well as the bubble and nonbubble subperiods. The key variables of interest are MONEY [1, 5] and MONEY[1, 10], which represent underwriter j's IPO profitability over the next 5 and 10 trading days, respectively. Results are consistent with our event-study findings: Commissions received today by lead underwriter j are positively related to future money left on the table by underwriter j. For the full sample, the coefficient on MONEY[1, 5] is 0.004 (t-statistic = 2.59), and for MONEY[1, 10], the coefficient estimate is 0.003 (t-statistic = 2.45). Subsample regression results for both bubble and nonbubble periods are all consistent with results reported in the full sample with one exception: the MONEY[1, 5] coefficient for the nonbubble subsample becomes insignificant (t-statistic = 1.43).

TABLE 3

Calendar-Time Regressions

Table 3 presents calendar-time regressions where brokerage commissions received by the lead underwriter ($COMMISSIONS_t$) is the dependent variable. Lead underwriter brokerage commissions are regressed against the following independent variables: MONEY is the 1st-day closing price minus the offer price times the number of shares offered, and for each lead underwriter we aggregate MONEY over the [+1, +5] period or the [+1, +10] period; $COMMISSIONS_{-1}$, $COMMISSIONS_{-2}$, $COMMISSIONS_{-3}$, and $COMMISSIONS_{-4}$ are the 4 prior days of lead underwriter daily commissions; and $|MKTRET_0|$ is the absolute value of the equal-weighted CRSP market return on that day. All regressions include month fixed effects. Numbers in parentheses are Newey-West (1987) t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: $COMMISSIONS_t$					
Independent Variable	All Periods (1999–2005)		Bubble Period (1999–2001)		Nonbubble Period (2002–2005)	
INTERCEPT	149.902 (0.15)	79.556 (0.08)	2,231.242* (1.95)	2,216.043* (1.93)	26,249.30*** (4.42)	26,218.14*** (4.42)
MONEY[1, 5]	0.004*** (2.59)		0.004*** (2.71)		0.015 (1.43)	
MONEY[1, 10]		0.003** (2.45)		0.003** (2.25)		0.016** (2.37)
$COMMISSIONS_{-1}$	0.411*** (11.07)	0.412*** (11.06)	0.378*** (9.11)	0.378*** (9.12)	0.417*** (9.05)	0.417*** (9.03)
$COMMISSIONS_{-2}$	0.185*** (7.27)	0.184*** (7.23)	0.199*** (7.20)	0.199*** (7.20)	0.182*** (5.75)	0.180*** (5.71)
$COMMISSIONS_{-3}$	0.165*** (7.46)	0.165*** (7.44)	0.137*** (5.85)	0.137*** (5.85)	0.173*** (6.28)	0.173*** (6.26)
$COMMISSIONS_{-4}$	0.181*** (8.79)	0.181*** (8.76)	0.213*** (10.00)	0.212*** (10.00)	0.172*** (6.86)	0.172*** (6.83)
$\|MKTRET_0\|$	929,611*** (10.40)	935,022*** (10.44)	749,451*** (7.38)	751,742*** (7.39)	1,177,383*** (7.35)	1,185,910*** (7.38)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2 %	79.59	79.56	74.38	74.37	79.87	79.85

Our results suggest that for every $1 left on the table, the lead underwriter receives between 0.3¢ and 0.4¢ in abnormal commissions. In order to provide some inference with respect to the marketwide level of abnormal commissions, we again gross up our estimate based on the assumption that institutions are responsible for 70% of CRSP volume. Given that our data represent 7.97% of CRSP volume, we estimate marketwide abnormal commissions of between 2.66¢ and 3.54¢ for every $1 left on the table.

2. Difference-of-Differences Test

Lowry and Schwert (2002) suggest that IPO activity is related to lagged market activity. If IPO issuance clusters during periods of high market volumes, then aggregate commission payments to all brokerage firms, and not just the lead underwriter, would increase just prior to hot IPO offer dates. We address this concern using a difference-of-differences test to directly compare event-period commission revenues received by lead underwriters to the commissions received by other brokerage firms in the database.

For each IPO, we construct a comparative sample of nonlead underwriting brokers by requiring that a broker cannot act as a lead underwriter for any IPO during the [–10, +10] day period surrounding a sample IPO's offer date. By comparing the time series of commission revenues for lead underwriters to that of nonlead brokers, we control for external market conditions affecting all brokers.

For each IPO, we calculate the average daily event-period commission revenue [–10, –1] minus the average daily nonevent commission revenue from [–60, –21] and [21, 60], and we divide this difference by the average daily nonevent-period commission revenue. As such, our measure is the percentage change in commission revenue a brokerage firm experiences in the 10-day period immediately preceding the IPO offer date. This normalization controls for cross-sectional differences across brokers in each group and is similar to the methodology employed by Goldstein, Hotchkiss, and Sirri (2007). We construct this measure for 3 groups: the lead underwriter, a matched-pair control sample where the lead underwriter is matched with 1 nonlead brokerage firm that is closest in average daily nonevent commission revenue, and a control portfolio of all nonlead brokerage firms. For brevity we limit our tests to the [–10, –1] event period, since this is where we find a significant increase in lead-underwriter commission revenue.

Our results are reported in Table 4 and are consistent with all earlier results. For the highest 2 MONEY quartiles, we find that lead-underwriter commissions increase by 8.49% (quartile 4) and 5.29% (quartile 3).[22] Untabulated results demonstrate that these numbers are similar across the bubble and nonbubble subperiods, so the magnitude of these increases is relatively consistent across time. For quartiles 2 and 1, lead-underwriter commission revenues change by –0.53% and by –3.33%, respectively. These findings are quite apparent when illustrated graphically as in Figure 1, which plots the change in daily commission revenue during the [–20, +20] period.

Comparing lead-underwriter revenues to the control samples in Table 4 is particularly revealing. Nonlead brokers display mixed evidence of increased commission revenues around quartiles 3 and 4 IPOs. For the matched control sample, brokerage revenues change by –1.20% prior to quartile 3 IPOs and by 2.68% prior to quartile 4 IPOs. However, both of these changes are insignificant. For the control portfolio, we find that abnormal commissions increase by 1.80% for quartile 3 and by 3.70% for quartile 4 IPOs.

To test for differences between the samples, we take the percentage commission change for each IPO-lead underwriter observation and subtract the percentage commission change for the appropriate control sample. For quartile 4 (quartile 3) IPOs, we find that lead underwriters experience increases in commission revenues that are 5.80% (6.49%) larger than the matched control sample and 4.79% (3.49%) larger than the control portfolio sample. Overall, these robustness tests indicate that our primary results cannot be attributed to unusually high marketwide volume.

[22]The results in Table 2 are aggregates of commission dollars to lead underwriters across all IPOs, while the statistics in Table 4 are constructed from ratios of each lead underwriter's event and nonevent periods. The ratio of the aggregate numbers in Table 2 will be different than the average of the ratios shown in Table 4.

TABLE 4

Difference of Differences

Table 4 presents a difference-of-differences test for abnormal commissions in the 10-day period before the IPO offer date. Our sample contains 1,156 IPOs with offer dates between March 31, 1999 and October 1, 2005. IPOs are divided into quartiles each year based on the variable MONEY, which is the difference between the 1st-day closing price and the offer price times the number of shares offered. For each IPO, we calculate ABNORMAL_COMMISSIONS (%) for 3 groups: the Lead Underwriter Sample, a Matched Control Sample, and a Control Portfolio, where ABNORMAL_COMMISSIONS are calculated as the average daily commission during the [–10, –1] event period minus the average daily commission during the [–60, –21] and [+21, +60] nonevent period, divided by the average daily nonevent-period commission. Control sample brokerage firms cannot act as lead underwriter for any IPO during the [–10, +10] period around the IPO offer date. The Matched Control Sample includes the control brokerage firm with average daily nonevent commissions that are closest to the lead underwriter. The Control Portfolio sample includes all control sample brokerage firms. The difference of differences is the ABNORMAL_COMMISSIONS (%) for the lead underwriter minus the ABNORMAL_COMMISSIONS (%) for either the Matched Control or Control Portfolio sample. By construction, *t*-statistics for our difference-of-differences tests normalize commission dollars using nonevent-period levels. *t*-statistics are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. **Bold** indicates a statistically positive difference, and *italics* indicate a statistically negative difference.

	ABNORMAL_ COMMISSIONS (%)	(*t*-Stat.)	Difference of Differences	(*t*-Stat.)
Quartile 1 (low MONEY)				
Lead Underwriter Sample	–3.33%	(–1.33)		
Matched Control Sample	0.27%	(0.12)	–3.51%	(–1.03)
Control Portfolio	–1.04%	(–1.21)	–2.29%	(–0.95)
Quartile 2				
Lead Underwriter Sample	–0.53%	(–0.20)		
Matched Control Sample	*–4.12%**	(–1.92)	3.61%	(1.13)
Control Portfolio	–0.63%	(–0.65)	0.12%	(0.05)
Quartile 3				
Lead Underwriter Sample	**5.29%****	(2.36)		
Matched Control Sample	–1.20%	(–0.62)	**6.49%****	(2.47)
Control Portfolio	**1.80%***	(1.80)	**3.49%***	(1.73)
Quartile 4 (high MONEY)				
Lead Underwriter Sample	**8.49%*****	(3.69)		
Matched Control Sample	2.68%	(1.29)	**5.80%****	(2.39)
Control Portfolio	**3.70%*****	(3.15)	**4.79%****	(2.46)

V. Trading Strategies

A. All Trading Strategies

Institutions might employ a variety of trading strategies to increase the commission dollars sent to lead underwriters. These behaviors include: increasing the total number of trades sent to the lead underwriter, increasing the average commission per share paid, paying unusually high commissions for some trades, or churning stocks with the explicit purpose of generating commissions. These alternatives are not mutually exclusive, and all would increase commission revenues. There is anecdotal evidence that some institutions paid unusually high commissions per share or churned stocks (bought and sold the same stock simultaneously in order to generate commissions) in return for IPO allocations; however, we do not know whether these activities are pervasive.[23] We investigate

[23]Regulatory agents alleged that clients paid excess commissions to CSFB in return for IPO allocations by paying excessively high commissions per share and by churning large numbers of shares of very liquid stocks (SEC News Release 2002-14). We refer readers to Ritter and Welch (2002) for other anecdotal examples of these quid pro quo commission arrangements. Smith and Bray (2009) also note that a class action lawsuit against more than a dozen underwriters was settled in October 2009 for $586 million, alleging that the underwriters "collected larger-than-normal commissions in the (IPO) process."

each of these trading behaviors to determine whether they contribute to elevated lead-underwriter commissions.

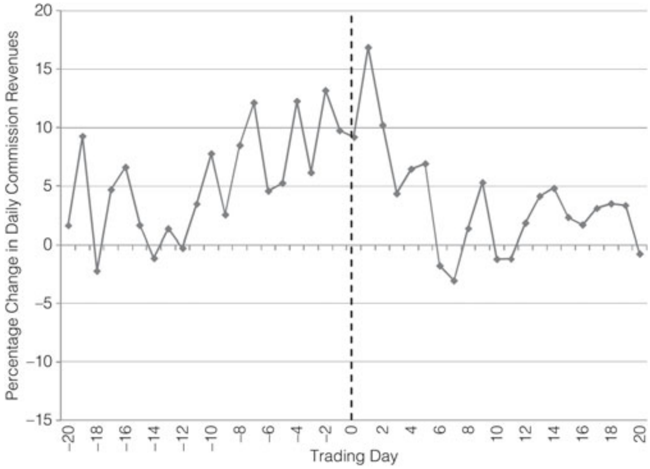
We repeat the event study methodology outlined in Table 2 for the following lead-underwriter variables: i) shares traded, ii) average share-weighted commission, iii) percentage of trades paying unusually high commissions (greater than

FIGURE 1

Lead-Underwriter Commission Revenues

Figure 1 presents abnormal commissions received by lead underwriters around the IPO offer date. Our sample contains 1,156 IPOs with offer dates between March 31, 1999 and October 1, 2005. IPOs are divided into quartiles each year based on the variable MONEY, which is the difference between the 1st-day closing price and the offer price times the number of shares offered. For each day, we calculate abnormal commissions by subtracting the average daily non-event commission revenue during the [–60, –21] and [+21, +60] period, and then divide this difference by the non-event mean. We present the average abnormal daily commission revenue during the [–20, +20] period for each quartile.

Graph A. Quartile 4 (high MONEY)



Graph B. Quartile 3

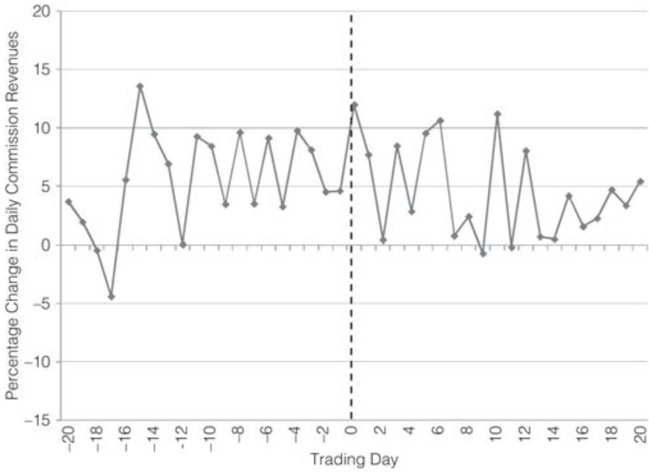


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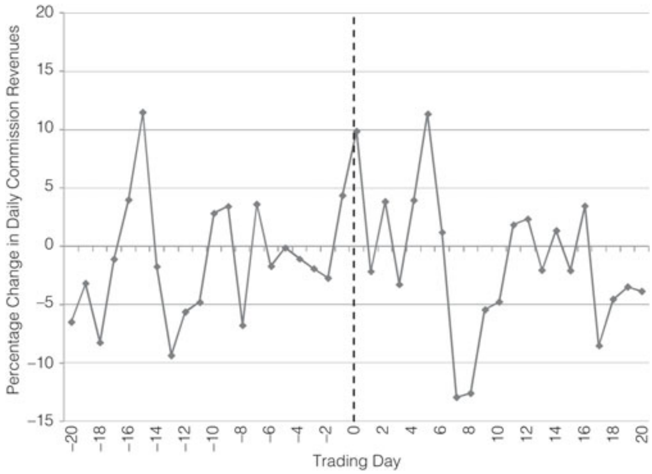
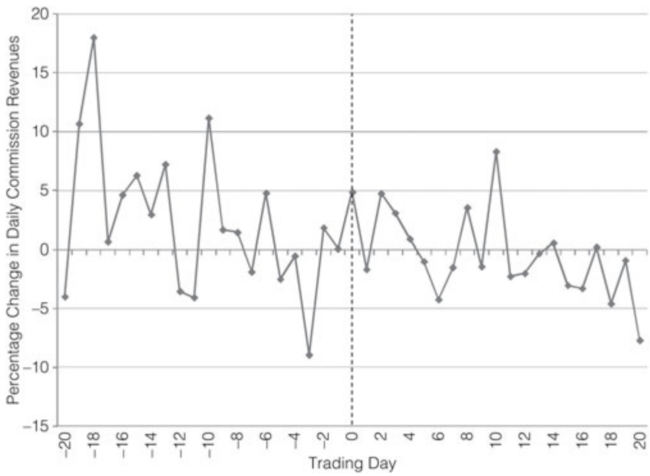
FIGURE 1 (continued)

Lead-Underwriter Commission Revenues

Graph C. Quartile 2



Graph D. Quartile 1 (low MONEY)



10¢ per share), and iv) commission revenues from round-trip trades. Table 5 reports average daily statistics for all variables in the nonevent period and abnormal daily levels (event period minus nonevent period) in the event period.

In Table 5 our 1st measure, SHARES_TRADED, is the average daily number of shares executed (in millions) by the lead underwriter. While NRZ (2007) also examine shares traded, they are restricted to aggregate trading, while we are able to distinguish trading through the lead underwriter. Consistent with our earlier results, we find evidence of elevated SHARES_TRADED only during the period immediately preceding the most profitable IPOs. For the highest MONEY quartile, lead underwriters handle 11.93 million shares per day in the nonevent period, and this amount increases by 0.39 million shares (t-statistic = 2.24) per day in the

10-day period before the IPO. For quartile 3, the increase in share volume is 0.31 million shares per day (t-statistic = 1.89). We find some evidence of statistically significant increases in SHARES_TRADED during both bubble and nonbubble periods. During the bubble period, the increase in SHARES_TRADED for quartile 4 is 0.26 million shares per day (t-statistic = 1.65), while quartile 3 experiences an increase of 0.77 million shares per day (t-statistic = 2.13) during the nonbubble period. Our results collectively indicate that lead underwriter share volume increases prior to hot IPOs.

TABLE 5

Trading Strategies around IPO Issuance

Table 5 presents event study results for 4 different lead underwriter trading variables around the IPO offer date. Our sample contains 1,156 IPOs with offer dates between March 31, 1999 and October 1, 2005. IPOs are divided into quartiles each year based on the variable MONEY, which is the difference between the 1st-day closing price and the offer price times the number of shares offered. We report the average daily statistics for 4 variables during the nonevent period, which is the period [–60, –21] and [+21, +60] surrounding the IPO offer date (event day 0). The 4 variables are: i) SHARES_TRADED (m), which is the number of shares traded through the lead underwriter in millions; ii) CHURN_COMMISSIONS, the commission revenue received by the lead underwriter for round-trip intradaily trades; iii) COMMISSIONS_PER_SHARE, the share-weighted daily average commissions per share (in ¢) for all trades executed by the lead underwriter that pay an explicit commission; and iv) FREQUENCY > 0.10, the fraction of trades executed by the lead underwriter that pay commissions greater than 10¢ per share. We then present the average abnormal daily statistics for all 4 measures (event-period daily average minus nonevent-period daily average) for 4 event periods surrounding the IPO offer date: [–20, –11], [–10, –1], [+1, +10], and [+11, +20]. We separate the sample of IPOs into the bubble period (1999–2001) and nonbubble period (2002–2005) and repeat our analysis for the event period [–10, –1]. t-statistics are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. **Bold** indicates a statistically positive difference, and *italics* indicate a statistically negative difference.

	Quartile 1 (low MONEY)		Quartile 2		Quartile 3		Quartile 4 (high MONEY)	
	SHARES_TRADED (m)	CHURN_COMMISSIONS	SHARES_TRADED (m)	CHURN_COMMISSIONS	SHARES_TRADED (m)	CHURN_COMMISSIONS	SHARES_TRADED (m)	CHURN_COMMISSIONS
Panel A. SHARES_TRADED and CHURN_COMMISSIONS								
All Periods (1999–2005)								
Nonevent period	8.19	20,885	7.69	18,924	9.17	23,050	11.93	31,108
Abnormal activity								
[–20, –11]	0.22	85	–0.09	–538	–0.01	–985	0.11	–473
	(1.56)	(0.10)	(–0.63)	(–0.57)	(–0.04)	(–0.87)	(0.49)	(–0.35)
[–10, –1]	0.12	449	–0.17	–936	**0.31***	112	**0.39****	**2,510****
	(0.86)	(0.50)	(–1.28)	(–0.99)	**(1.89)**	(0.10)	**(2.24)**	**(2.62)**
[+1, +10]	–0.15	–617	*–0.36****	–1,415	0.08	–349	–0.21	–1,092
	(–0.87)	(–0.69)	*(–2.60)*	(–1.52)	(0.55)	(–0.31)	(–1.14)	(–0.81)
[+11, +20]	–0.18	–682	–0.23	–1,314	**0.29***	384	0.19	607
	(–1.21)	(–0.75)	(–1.33)	(–1.40)	**(1.75)**	(0.34)	(0.89)	(0.45)
Bubble (1999–2001)								
Nonevent period	5.92	12,986	6.81	13,981	7.60	16,073	9.45	21,013
Abnormal activity								
[–10, –1]	–0.01	167	–0.08	–304	0.06	41	**0.26***	**1,650*****
	(–0.03)	(0.32)	(–0.58)	(–0.52)	(0.38)	(0.09)	**(1.65)**	**(3.15)**
Nonbubble (2002–2005)								
Nonevent period	12.18	35,313	9.31	28,967	12.09	35,817	16.65	50,352
Abnormal activity								
[–10, –1]	0.35	965	–0.35	2,219	**0.77****	242	0.65	4,150
	(1.06)	(0.43)	(–1.19)	(0.98)	**(2.13)**	(0.08)	(1.59)	(1.61)

(continued on next page)

TABLE 5 (continued)

Trading Strategies around IPO Issuance

	Quartile 1 (low MONEY)		Quartile 2		Quartile 3		Quartile 4 (high MONEY)	
	COMMISSIONS_PER_SHARE	FREQUENCY > 0.10 (%)	COMMISSIONS_PER_SHARE	FREQUENCY > 0.10 (%)	COMMISSIONS_PER_SHARE	FREQUENCY > 0.10 (%)	COMMISSIONS_PER_SHARE	FREQUENCY > 0.10 (%)
Panel B. COMMISSIONS_PER_SHARE and FREQUENCY > 0.10 (%)								
All Periods (1999–2005)								
Nonevent period	4.87	0.27	4.88	0.22	4.83	0.32	4.84	0.47
Abnormal activity								
[–20, –11]	0.02 (1.02)	0.06 (0.68)	–0.01 (0.71)	–0.02 (–0.49)	–0.01 (–0.64)	*–0.10** *(–1.84)*	0.00 (0.04)	0.01 (0.13)
[–10, –1]	0.02 (1.04)	0.09 (1.23)	**0.04**** **(2.12)**	0.04 (0.45)	**0.03*** **(1.89)**	0.07 (1.10)	**0.06***** **(3.11)**	**0.20***** **(2.97)**
[+1, +10]	0.01 (0.92)	0.09 (1.34)	0.02 (1.11)	–0.07 (–1.61)	0.03 (1.41)	–0.01 (–0.16)	0.03 (1.47)	**0.17***** **(2.55)**
[+11, +20]	–0.01 (–0.09)	–0.02 (–0.29)	0.00 (0.20)	0.03 (0.05)	0.02 (1.21)	0.01 (0.09)	–0.01 (–0.79)	–0.05 (–0.69)
Bubble (1999–2001)								
Nonevent period	5.15	0.30	5.09	0.28	5.08	0.42	5.10	0.61
Abnormal activity								
[–10, –1]	0.03 (1.25)	0.11 (0.91)	**0.05**** **(2.23)**	0.05 (0.77)	0.03 (1.64)	0.07 (0.81)	**0.06***** **(2.80)**	**0.30***** **(3.29)**
Nonbubble (2002–2005)								
Nonevent period	4.40	0.22	4.46	0.13	4.37	0.16	4.36	0.18
Abnormal activity								
[–10, –1]	–0.03 (–1.51)	0.08 (0.83)	0.01 (0.43)	–0.01 (–0.20)	0.02 (1.14)	0.07 (1.12)	**0.04**** **(1.99)**	0.01 (0.24)

Institutions might increase trading volume sent to the lead underwriter either by reallocating "normal" trading volume or by churning stocks. Our results offer little support for the contention that institutions are simply reallocating trading volume through time, since elevated shares in the [–10, –1] period would imply significant decreases in shares traded during other periods (e.g., in the 20 days after the IPO). Alternatively, institutions might churn stocks by simultaneously entering buy and sell orders for the same stock. We test for the existence of this activity by collecting all transactions where institutions purchase and sell the same stock on the same day.[24] For each IPO, we then select all churn trades where at least one side of the transaction is executed by the lead underwriter and aggregate trading commissions each day for each IPO's lead underwriter. We recognize that institutions might buy and sell the same stock for reasons other than commission

[24]In untabulated robustness tests, we restrict the definition of churn trades to include only buy and sell transactions by the same institution on the same trading day where the buy and sell price differ by less than 1%. Our results are consistent with those presented in Table 5.

generation. For this reason, we control for the base level of round-trip trading by subtracting nonevent-period levels, as we are only concerned with *changes* in this type of activity routed through the lead underwriter.

Panel A of Table 5 shows that commissions from round-trip trades (CHURN_COMMISSIONS) increase by $2,510 per day ($t$-statistic = 2.62) in the [–10, –1] period for the highest MONEY quartile. By comparing these results with overall changes in commission revenue reported in Table 2, we find that churn commissions account for approximately 11% of the total increase in commission revenue. However, we find no evidence of significant increases in CHURN_COMMISSIONS for any other quartile. We also examine the bubble and nonbubble periods separately and find that significant abnormal churning is only evident in the bubble period. Our results are consistent with circumstantial evidence presented by NRZ (2007) but also suggest that round-trip transactions represent only a fraction of the pay-for-IPO picture.

Institutions can also increase the per-share commissions paid on trades. We use 2 variables in our tests: average per-share commission (COMMISSIONS_PER_SHARE, measured in ¢) received by the lead underwriter, and the frequency of trades paying greater than 10¢ per share. A commission greater than 10¢ a share is unusually large (Goldstein et al. (2009)), but paying a large commission is an effective way to increase underwriter commission revenues.

For the COMMISSIONS_PER_SHARE measure, we calculate the share-weighted daily average commission for all commission-paying trades executed by the lead underwriter. In Panel B of Table 5 we find some evidence that average COMMISSIONS_PER_SHARE increases in the [–10, –1] period for the top 3 IPO quartiles. In the most profitable quartile, lead underwriters receive average commissions of 4.90¢ per share in the [–10, –1] period, compared to the nonevent average of 4.84¢. For quartile 3, COMMISSIONS_PER_SHARE increase from 4.83¢ in the nonevent period to 4.86¢ during the [–10, –1] period. Although our tests indicate an increase in COMMISSIONS_PER_SHARE for quartile 2 IPOs, this increase is not large enough to significantly affect total abnormal commission payments received by these underwriters (see Tables 2 and 4).

The final variable in our analysis investigates the frequency of lead underwriter trades where commissions are greater than 10¢ per share. For quartile 4 IPOs, the frequency of high commission trades increases by 42%, from the 0.47% nonevent mean to 0.67% during the [–10, –1] event period. Unlike other measures, this ratio remains elevated (0.64%) during the 10 days following the IPO, which is consistent with ex post settling up after IPO allocations (see footnotes 6 and 18). However, the lack of confirming evidence in total commission revenue in Table 2 cautions against concluding that widespread ex post settling up occurred. Our subperiod analyses indicate that increases in very high commission trades occurred only during the excesses of the bubble period, but that both periods show statistically elevated COMMISSIONS_PER_SHARE for the most profitable quartile.

Collectively, our results indicate that institutions use a variety of trading strategies to increase lead-underwriter commissions. The total number of shares traded, commissions from round-trip trades, average commission per share, and frequency of trades paying greater than 10¢ per share are all significantly elevated in the preoffer period for the most profitable IPOs.

B. Churning and Stock Liquidity

The practice of sending increased commission revenues to the lead underwriter by churning stocks has received attention in both the popular press and academic literature. Specifically, NRZ (2007) propose that stock churning, if it exists, should be concentrated in only the most liquid shares. We investigate the presence of CHURN_COMMISSIONS in greater detail to determine whether this supposition is borne out in our data.

For each sample month, we sort all CRSP stocks into liquidity deciles using 2 measures of liquidity: Amihud's (2002) illiquidity measure and dollar trading volume.[25] The intuition behind Amihud's illiquidity measure is as follows: A stock whose price moves more (relative to other stocks) in response to a given dollar amount of trading volume is more illiquid. This measure is particularly well suited for our analysis, since it proxies for the cost of trading (e.g., price impact), which is of primary importance for institutions that churn stocks. While the number of stocks in each liquidity decile varies from month to month, on average, each decile contains approximately 747 stocks.

We assign each stock that is traded in the Ancerno database to its CRSP liquidity decile rank based on the prior month ranking. Our assignment of liquidity deciles based on prior month liquidity attributes is consistent with NRZ (2007) and avoids any potential look-ahead bias. We repeat the CHURN_COMMISSIONS analysis reported in Table 5 for each liquidity decile and report results for MONEY quartile 4 (high MONEY) in Table 6. Panel A of Table 6 reports our results for deciles ranked by Amihud's (2002) illiquidity measure. Our results show increases in CHURN_COMMISSIONS in the 2 most liquid deciles of stocks. CHURN_COMMISSIONS increase by \$2,084 (t-statistic = 2.31) in the most liquid decile, and by \$364 (t-statistic = 2.51) in the 2nd most liquid decile. Our subperiod analysis of bubble and nonbubble periods shows that abnormal CHURN_COMMISSIONS are present in both periods.

Panel B of Table 6 reports our results for liquidity deciles based on an alternate liquidity measure: dollar trading volume. Again, we find evidence of increases in CHURN_COMMISSIONS in the 2 most liquid stock deciles. CHURN_COMMISSIONS increase by \$2,253 (t-statistic = 2.36) in the most liquid decile, and by \$269 (t-statistic = 2.32) in the 2nd most liquid decile. However, unlike our previous results using Amihud's (2002) illiquidity measure, we now find that evidence of abnormal CHURN_COMMISSIONS is restricted to the bubble period.

Our results on stock liquidity and CHURN_COMMISSIONS both confirm and expand results presented by NRZ (2007). Specifically, NRZ restrict their analysis to the 50 most liquid stocks but also state that "although IPO-related trading is more likely to be associated with large liquid stocks, our choice of

[25]Amihud's (2002) illiquidity measure is constructed for each stock-day as the absolute value of the stock's daily return divided by the stock's total dollar trading volume for the day. We average this measure for each stock for all trading days in the month. Since higher values of Amihud's measure indicate stocks with greater illiquidity, our liquidity deciles are in the reverse order of the Amihud measure: The highest liquidity decile, decile 10, has the lowest Amihud scores. Dollar trading volume is the average daily dollar volume of trading for each stock, averaged over all trading days in the month.

TABLE 6

Churn Commissions by Liquidity Deciles

Table 6 presents event study results for abnormal churn commissions in stock liquidity deciles around the IPO offer date. Our sample contains 1,156 IPOs with offer dates between March 31, 1999 and October 1, 2005. For each sample month, we sort all stocks in the CRSP database into liquidity deciles using 2 measures of liquidity: Amihud's (2002) illiquidity measure and dollar trading volume. Amihud's illiquidity measure is constructed for each stock-day as the absolute value of the stock's daily return divided by the stock's total dollar trading volume for the day. We average this measure for each stock for all trading days in the month. Dollar trading volume is the average daily dollar volume of trading for each stock, averaged over all trading days in the month. We then assign each stock in the Ancerno database to its CRSP liquidity decile rank based on the prior month ranking. IPOs are divided into quartiles each year based on the variable MONEY, which is the difference between the 1st-day closing price and the offer price times the number of shares offered. We report the average daily statistic CHURN_COMMISSIONS for each liquidity decile for MONEY quartile 4 (high MONEY) during the nonevent period, which is the period [–60, –21] and [+21, +60] surrounding the IPO offer date (event day 0). CHURN_COMMISSIONS is the commission revenue received by the lead underwriter for round-trip intradaily trades. We then present the average abnormal daily statistics for churn commissions (event-period daily average minus nonevent-period daily average) for the event period [–10, –1]. We separate the sample of IPOs into the bubble period (1999–2001) and nonbubble period (2002–2005) and repeat our analysis. *t*-statistics are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. **Bold** indicates a statistically positive difference, and *italics* indicate a statistically negative difference.

	(least liquid) Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	(most liquid) Decile 10
Panel A. CHURN_ COMMISSIONS (by Amihud illiquidity deciles)										
All Periods (1999–2005)										
Nonevent period	1	1	3	15	36	66	251	622	2,381	27,490
Abnormal activity	–1	–1	–2	–6	–9	–6	113	18	**364****	**2,084****
[–10, –1]	(–0.73)	(–0.82)	(–1.28)	(–0.86)	(–0.87)	(–0.63)	(1.25)	(0.29)	**(2.51)**	**(2.31)**
Bubble (1999–2001)										
Nonevent period	0	1	0	3	13	28	106	386	1,381	18,838
Abnormal activity	0	–1	0	1	–3	10	2	75	156	**1,546*****
[–10, –1]	(0.00)	(–0.33)	(0.16)	(0.49)	(–0.94)	(1.30)	(0.14)	(1.07)	(1.43)	**(3.25)**
Nonbubble (2002–2005)										
Nonevent period	4	3	8	39	81	141	524	1,071	4,288	43,984
Abnormal activity	–2	–2	–6	–17	–18	–36	326	–92	**760****	3,110
[–10, –1]	(–0.75)	(–0.62)	(–1.34)	(–0.93)	(–0.60)	(–1.38)	(1.23)	(–0.76)	**(2.17)**	(1.26)
Panel B. CHURN_COMMISSIONS (by dollar trading volume deciles)										
All Periods (1999–2005)										
Nonevent period	2	2	4	15	42	92	270	708	2,131	27,604
Abnormal activity	–1	–1	1	–2	–4	13	–11	38	**269****	**2,253****
[–10, –1]	(–1.12)	(–0.99)	(0.46)	(–0.50)	(–0.41)	(1.00)	(–0.27)	(0.82)	**(2.32)**	**(2.36)**
Bubble (1999–2001)										
Nonevent period	0	1	3	11	26	62	235	511	1,691	18,214
Abnormal activity	0	–1	–2	2	5	**26*****	–32	22	**291****	**1,472*****
[–10, –1]	(0.72)	(–0.66)	(–1.55)	(0.52)	(0.80)	**(3.59)**	(–0.68)	(0.56)	**(2.25)**	**(2.73)**
Nonbubble (2002–2005)										
Nonevent period	5	3	6	22	71	148	336	1,083	2,969	45,502
Abnormal activity	–3	–2	6	–10	–22	–13	30	68	227	3,741
[–10, –1]	(–1.04)	(–0.83)	(1.63)	(–1.12)	(–0.80)	(–0.36)	(0.62)	(0.58)	(1.19)	(1.46)

the top 50 stocks is somewhat arbitrary. It is plausible that stocks ranked among the top 200 or 500 could also be good candidates" (NRZ, p. 92). Since our liquidity deciles each contain about 750 stocks and we find evidence of abnormal CHURN_COMMISSIONS in the top 2 deciles, our results confirm that abnormal round-trip trading is concentrated in liquid stocks, but that this activity is evident in a much broader sample of liquid stocks than that considered by NRZ.

VI. Determinants of Abnormal Commissions

The event study, calendar-time portfolio regression, and the difference-of-differences test results establish that, across a broad sample of lead underwriters, abnormal commission payments occur primarily in the 10 days preceding the most profitable IPOs. Here we extend our analysis by investigating the determinants of preissue abnormal commission (AC) payments to the lead underwriter:

$$\text{(2)} \quad \text{AC}_i = \alpha + \beta_1 \text{PRICE\_RUNUP}_i + \beta_2 \text{UNDERPRICING}_i + \beta_3 \text{OFFER\_SIZE}_i + \beta_4 \text{HERFINDAHL}_{i,j} + \beta_5 \text{SCARCITY}_i + \beta_6 \text{TOP\_TIER}_j + \sum_{m=1}^{6} \delta_m \text{YEAR}_{1999+m} + \varepsilon.$$

The dependent variable, AC, is the natural logarithm of the lead underwriter's average daily commissions during the [–10, –1] event period divided by the average daily commission during the [–60, –21] and [+21, +60] nonevent period for the *i*th IPO. This normalization captures the relative magnitude of the underwriter's incentive to allocate IPO shares to transient investors.

Equation (2) allows us to test Hypothesis 2 by forming a Herfindahl index (HERFINDAHL) for each lead underwriter based on commission revenue during the [–270, –21] trading day period prior to the IPO offer date.[26] A higher Herfindahl index indicates a more concentrated client base, and therefore a larger potential punishment for the lead underwriter if one of their clients discovers an allocation to transient investors. Hypothesis 2 predicts a negative relation between client concentration (HERFINDAHL) and AC.

To control for IPO profitability, we include the variables PRICE_RUNUP, UNDERPRICING, and OFFER_SIZE. Total ex post profitability (MONEY) is calculated as UNDERPRICING × OFFER_SIZE, and we include each of these components separately in equation (2). A larger OFFER_SIZE could provide greater opportunities for transient investors to obtain an allocation. However, since institutions send abnormal commission payments prior to the IPO offer date, the relevant construct for our tests is expected profitability. Benveniste and Spindt (1989) note that changes in the offer price between the preliminary prospectus filing and the offer date reflect information concerning preissue demand, and Hanley (1993) provides evidence that preoffer price adjustment is highly correlated with ex post IPO profitability. We construct PRICE_RUNUP, which is the offer price less the midpoint of the filing range divided by the midpoint of the filing range (as in Hanley), and use it as a measure of expected profitability. We expect that PRICE_RUNUP, UNDERPRICING, and OFFER_SIZE will be positively related to AC. However, due to the high positive correlation ($\rho = 0.64$) between

[26]Since the Ancerno database begins on January 1, 1999, we do not have a full year [–270, –21] of trading data available to estimate the Herfindahl index for IPOs with offer dates in 1999. For these IPOs we use the maximum number of days available. In robustness tests, we construct the Herfindahl index over the [–60, –21] and [21, 60] nonevent period and find results that are similar to those reported.

UNDERPRICING and PRICE_RUNUP, we include them both separately and together in different specifications of equation (2).

We control for several other characteristics of the IPO and lead underwriter. SCARCITY attempts to measure preissue demand for the IPO and is calculated as the final offer size divided by the 1st filed offer size. We include the variable TOP_TIER to control for underwriter reputation. TOP_TIER is a dummy variable that is equal to 1 if the lead underwriter is considered to be a prestigious national underwriter according to Carter and Manaster (1990) underwriter rankings. Carter and Manaster underwriter rankings range from 1 to 9, and consistent with Loughran and Ritter (2004), we consider underwriters with a rank of 8 or 9 to be prestigious.[27,28] Finally, we include year fixed effects to control for changing market conditions across the sample period. We estimate the regression using the generalized method of moments (GMM) to control for any potential correlation in the error structure across observations.

Panel A of Table 7 presents our cross-sectional regression results for the entire sample.[29] We find that both UNDERPRICING and PRICE_RUNUP are significantly positively related to AC when examined independently. The coefficient on UNDERPRICING is 0.370 in column (1) (t-statistic = 2.40), and the estimate for PRICE_RUNUP in column (2) is 1.000 (t-statistic = 2.54). The other component of total IPO profitability, OFFER_SIZE, is positive and significant in all 3 regression specifications. These results confirm that AC are positively related to IPO profitability.

HERFINDAHL, a key variable of interest in this regression, is negative and significant in all regression specifications. The coefficient estimate is –4.197 (t-statistic = –2.53) in the 1st regression specification and is similar in both magnitude and statistical significance in specifications (2) and (3). Consistent with Hypothesis 2, the negative coefficient indicates that underwriters with a concentrated client base receive lower AC.

Other variables of interest include SCARCITY and TOP_TIER. We find no evidence that SCARCITY is related to abnormal commission payments. The coefficients on TOP_TIER range from 1.521 (t-statistic = 3.73) in column (1) to 1.558 (t-statistic = 3.80) in column (2). Our results suggest that higher reputation underwriters are more likely to receive abnormal commission payments in the period immediately preceding the IPO offer date.

We also run the above regressions using a subsample that excludes clustered IPOs to ensure that clustering does not affect our inferences in situations where an underwriter issues another IPO during the [–10, –1] event period. We construct a sample of 467 IPOs for which the lead underwriter did *not* serve as the lead underwriter on *any* other IPO during the [–10, +10] period. In the sample

[27] We obtain Carter and Manaster (1990) underwriter rankings from Jay Ritter's Web site (http://bear.warrington.ufl.edu/Ritter/rank.pdf).

[28] In robustness tests we use both Megginson and Weiss (1991) and Carter and Manaster (1990) underwriter rankings. Results are generally similar to those reported.

[29] We lose 4 observations due to data requirements for the creation of the Herfindahl index. As a result, our full sample in Panel A of Table 6 drops by 4 to 1,152 observations, and the sample in Panel B also drops by 4 from 467 to 463.

TABLE 7

Cross-Sectional Regressions

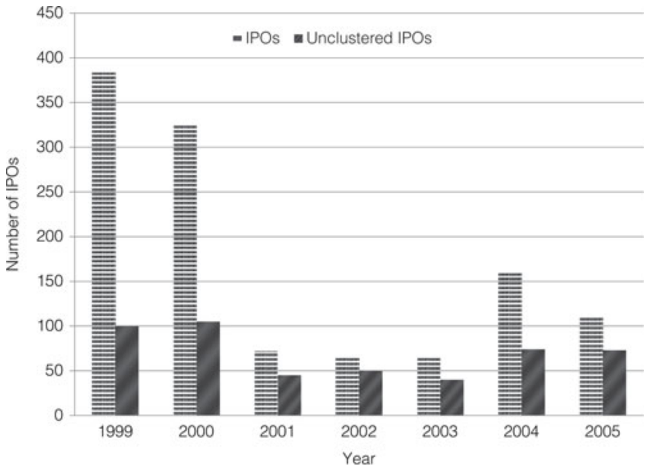
Table 7 presents cross-sectional regressions for the determinants of abnormal lead-underwriter commissions during the [–10, –1] event period immediately preceding the IPO offer date. The dependent variable, AC, is the natural logarithm of average daily commissions during the [–10, –1] event period divided by the average daily nonevent-period commission during the [–60, –21] and [+21, +60] nonevent period. Our regressions use the following independent variables: PRICE_RUNUP is the percentage difference between the offer price and the midpoint of the filing range; UNDERPRICING is the gross return on the 1st day of issue calculated as the (1st-day closing price – offer price) divided by the offer price; OFFER_SIZE is the dollar size of the IPO offered (measured as the number of shares offered times the offer price); HERFINDAHL is the Herfindahl index of the issuing brokers' client base and captures the concentration of trading volume across all institutional clients of the broker for the [–270, –21] trading day period; SCARCITY is the offer size divided by the initial filing size of the offer; and TOP_TIER is a dummy variable that measures the reputation of the lead underwriter. TOP_TIER is set equal to 1 if the lead underwriter is ranked either 8 or 9 using the Carter and Manaster (1990) underwriter rankings. We include year fixed effects in all regression specifications, and we estimate each regression using a standard GMM estimation procedure with Newey-West (1987) conditions on the calculated variance-covariance matrix. We present results for the full sample (1,152 IPO observations) in Panel A. We present a subsample of 463 observations in Panel B. The subsample is limited to IPOs where the issuing lead underwriter does not issue any other IPOs in the [–10, +10] day period surrounding the IPO offer date (offer date = 0). *t*-statistics are in parentheses below each coefficient estimate. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable = AC		
Independent Variables	(1)	(2)	(3)
Panel A. Full Sample			
INTERCEPT	–8.337***	–6.942***	–7.325***
	(–3.79)	(–3.06)	(–3.10)
PRICE_RUNUP		1.000**	0.741
		(2.54)	(1.45)
UNDERPRICING	0.370**		0.181
	(2.40)		(0.90)
OFFER_SIZE	0.376***	0.299**	0.317**
	(3.08)	(2.36)	(2.41)
HERFINDAHL	–4.197**	–4.168**	–4.170**
	(–2.53)	(–2.49)	(–2.49)
SCARCITY	–0.123	–0.119	–0.126
	(–0.19)	(–0.18)	(–0.19)
TOP_TIER	1.521***	1.558***	1.534***
	(3.73)	(3.80)	(3.75)
Year fixed effects	Yes	Yes	Yes
No. of obs.	1,152	1,152	1,152
Adjusted R^2 %	9.72	9.85	9.84
Panel B. Sample Excluding Clustered IPOs			
INTERCEPT	–16.324***	–13.912***	–15.896***
	(–3.80)	(–3.05)	(–3.46)
PRICE_RUNUP		1.719*	0.293
		(1.82)	(0.29)
UNDERPRICING	1.667***		1.609***
	(3.84)		(3.40)
OFFER_SIZE	0.810***	0.701***	0.787***
	(3.37)	(2.72)	(3.04)
HERFINDAHL	–5.164**	–5.163**	–5.197**
	(–2.36)	(–2.27)	(–2.38)
SCARCITY	–0.324	–0.375	–0.354
	(–0.28)	(–0.32)	(–0.31)
TOP_TIER	0.991**	1.178**	1.003**
	(2.01)	(2.36)	(2.03)
Year fixed effects	Yes	Yes	Yes
No. of obs.	463	463	463
Adjusted R^2 %	14.29	12.03	14.12

FIGURE 2

Distribution of IPOs through Time

Figure 2 presents the distribution of IPOs by year for our sample. Our sample contains 1,156 IPOs with offer dates between March 31, 1999 and October 1, 2005. In addition, the distribution of the 467 unclustered IPOs, for which there were no other IPOs issued by the same lead underwriter during the [–10, +10] period surrounding the IPO date, are also shown by year.



excluding clustered IPOs, underwriters may issue another IPO in the [–60, –21] and [+21, +60] nonevent period, which will only elevate nonevent commissions and bias our tests against rejection of the null hypothesis. Figure 2 shows the distribution by year for the overall sample of 1,156 IPOs and the subsample of 467 unclustered IPOs.[30]

Panel B of Table 7 presents regression results for the sample excluding clustered IPOs. Subsample results are similar to the results in the full sample. Specifically, we find that all measures of IPO profitability—UNDERPRICING, PRICE_RUNUP, and OFFER_SIZE—are still positive and statistically significant when examined independently. However, for the regression specification in column (2), the statistical significance of PRICE_RUNUP drops to the 10% level. We continue to find strong support of Hypothesis 2, in that the coefficient on HERFINDAHL continues to be negative and significant in all regression specifications. Also, coefficients on TOP_TIER continue to be positive and significant.

Overall, we find that higher abnormal commissions are associated with the more profitable IPOs as predicted by Hypothesis 1. As suggested by Hypothesis 2, we find direct confirmation that this effect is mitigated by a more concentrated underwriter client base. Both results are robust to a variety of regression specifications and to a restricted sample of unclustered IPOs.

[30]We run empirical tests presented in Tables 2, 4, and 5 on the unclustered control sample, and all of the results continue to hold. Due to the construction of the calendar-time regressions, we did not rerun Table 3 on this subsample.

VII. Abnormal Commissions and IPO Allocations

Stable investors who regularly send commission dollars to the underwriter expect to receive IPO allocations as a part of their business relationship. Transient investors opportunistically send commission revenues to the lead underwriter with expectations that these revenues will result in an allocation. Although we have presented empirical evidence that some investors send elevated commission revenue to lead underwriters, we have not yet established whether these excess payments result in a larger allocation of profitable IPO shares.

Unfortunately, IPO allocation data are not generally available. Reuter (2006) uses mutual fund family holdings as a proxy for IPO allocations. Since we cannot identify the institutions in our sample by name, this proxy is not available to us. However, we can supplement Reuter's analysis by examining net selling in the year after the IPO.[31] Using a methodology similar to Chemmanur and Hu (2007), we contend that net selling is a reliable proxy for initially allocated shares, and a particularly good proxy for realized profits.

We are interested in whether abnormal commissions paid by an institution to the lead underwriter are related to the size of that institution's IPO allocation, and whether the relation between abnormal commissions and IPO allocation varies across investor types as predicted in Hypotheses 3 and 4. To investigate these hypotheses we first run the following regression:

$$\begin{aligned}(3)\quad \text{ALLOCATION}_{i,k} = {} & \alpha + \beta_1\text{CLIENT\_SIZE}_{i,k} + \beta_2\text{UNDERPRICING}_i \\ & + \beta_3\text{ABNORMAL\_COMMISSIONS}_{i,k} + \beta_4\text{TRANSIENT}_{i,k,j} \\ & + \beta_5\text{ABNORMAL\_COMMISSIONS}_{i,k} \times \text{TRANSIENT}_{i,k,j} + \varepsilon.\end{aligned}$$

We construct the dependent variable, ALLOCATION, by tracking trading in IPO, i, by each institution, k, from the moment the IPO is listed for public trading through 365 calendar days following the IPO offer date. We calculate the net imbalance for each IPO-institution pairing and assume that all institutions that are net sellers receive an allocation equal to the magnitude of net sales.[32]

Empirically, our measure captures only allocated shares that institutions choose to flip in the year following the IPO. If, consistent with our expectations, transient investors are more likely to flip allocated IPO shares in order to realize their profits, then our proxy for IPO allocations is particularly well suited for transient investors. Alternatively, our measure will understate the total shares allocated when institutions hold some of their shares for more than 365 days, and this measurement error will bias against finding results in our regression specification.

[31]Our measure examines net IPO selling during the 365-calendar-day period after the IPO. In robustness tests, we limit our period of analysis to the 30 calendar days after the IPO and find results that are similar to those reported.

[32]It is also possible that this measure includes short sales by these institutions. While Hanley, Lee, and Seguin (1996) suggest that short sales are constrained immediately after an IPO, Edwards and Hanley (2010) demonstrate otherwise. Given that Ancerno clients are pension funds and money managers, it is unlikely that there is significant short-selling in the data. Even so, it is highly unlikely that any short-selling by clients would cause them to send abnormal commissions to the lead underwriter ex ante. As a result, any inclusion of short-selling in our data would bias against finding results.

We next normalize our allocation estimate by the number of shares offered to control for cross-sectional differences in net selling activity related to the size of the IPO. Clients with a positive buy-sell imbalance are assumed to receive no allocation, and therefore we estimate equation (3) using a truncated regression specification.

CLIENT_SIZE is the average daily commission revenue sent by institution k to the lead underwriter during the [–270, –21] nonevent trading day period divided by the total average daily commission revenue received by the lead underwriter from all institutions.[33] As such, CLIENT_SIZE captures the importance of a particular institution to the commission revenue of the lead underwriter. If stable relationships between underwriters and their major clients are an important determinant of IPO allocations, we expect to see a positive relation between CLIENT_SIZE and IPO allocation size.

We also include UNDERPRICING, which reflects the magnitude of actual profits available to IPO flippers, and, all else being equal, we expect more IPO flipping in hot IPOs. We calculate institution k's ABNORMAL_COMMISSIONS for each IPO as the aggregate 10-day abnormal commissions divided by the lead underwriter's nonevent average commission revenue. This normalization addresses our central economic question of how important an institution's abnormal commission payments are to the lead underwriter's revenue, as larger underwriters are less influenced by a given dollar amount of abnormal commissions.

We construct the dummy variable TRANSIENT using equation (4), which estimates an autocorrelation coefficient based on the past 6 months' relationship between underwriter j and institution k:

$$(4) \qquad \text{COMMISSIONS}_{j,k,t} \quad = \quad \alpha + \rho_{j,k}\text{COMMISSIONS}_{j,k,t-1} + \varepsilon.$$

We contend that stable clients pay regular commissions to the underwriter, so they will have relatively high month-to-month correlation in their commissions. To construct the dummy variable TRANSIENT, we divide the sample into 2 groups based on the median autocorrelation coefficient from equation (4). Institutions whose autocorrelation coefficient is less than the median are assigned a TRANSIENT value equal to 1, and 0 otherwise.[34]

All else being equal, we expect significantly fewer IPO shares are allocated to transient institutions. However, we are particularly interested in the interaction of ABNORMAL_COMMISSIONS and TRANSIENT: ABNORMAL_COMMISSIONS × TRANSIENT. A significant positive coefficient on this variable indicates that abnormal commissions are a more effective way for transient institutions to generate IPO allocations. We also estimate equation (3) separately for transient and stable investors, and we expect that CLIENT_SIZE will be a relatively more important explanatory variable for stable investors, while ABNORMAL_COMMISSIONS will be important for transient institutions.

[33]Since the Ancerno database begins on January 1, 1999, we do not have a full year [–270, –21] of trading data available to estimate the CLIENT_SIZE for IPOs with offer dates in 1999. For these IPOs we use the maximum number of days available. In robustness tests, we construct CLIENT_SIZE over the [–60, –21] and [21, 60] nonevent period and find results that are similar to those reported.

[34]The results associated with the TRANSIENT dummy variable are robust to alternative definitions of trading regularity.

Table 8 presents the results of maximum likelihood estimation for equation (3).[35] The positive and significant coefficient on CLIENT_SIZE in the 1st regression indicates that lead underwriters value stable commission relationships and reward these institutions with IPO allocations. However, we also find that ABNORMAL_COMMISSIONS are positively related to IPO allocations. The coefficient on ABNORMAL_COMMISSIONS is 0.0048 and is statistically significant (*t*-statistic = 3.01). It appears that allocations (or at least net selling soon

TABLE 8

Determinants of IPO Allocations

Table 8 presents cross-sectional regressions where ALLOCATION, a proxy for IPO shares allocated to each institution, is the dependent variable. Our sample contains 1,156 IPOs with offer dates between March 31, 1999 and October 1, 2005. ALLOCATION is constructed by first calculating the net trading imbalance in an IPO for each institution-IPO observation during the 365 calendar days following the IPO offer (this includes the offer date). Institutions with a negative net imbalance are assumed to have received an allocation equal to the magnitude of net sales, and institutions that are net buyers are assumed to receive no allocation. The absolute value of this measure normalized by shares offered in the IPO is our proxy for IPO allocation (ALLOCATION). CLIENT_SIZE is the percentage of lead-underwriter commission revenues that are sent to the underwriter by each institution during the [–270, –21] trading day period prior to the IPO offer date. UNDERPRICING is the gross return on the 1st day of issue calculated as the (1st-day closing price – offer price) divided by the offer price. ABNORMAL_COMMISSIONS is the abnormal average daily commissions paid by a particular client to the lead underwriter in the –10 to –1 period normalized by the average daily commissions received by the lead underwriter in the nonevent period. TRANSIENT is a dummy variable set to 1 if a client is a less regular customer with the lead underwriter, where estimates of customer regularity are obtained by estimating the 1st-order autocorrelation coefficient for commission revenues between a lead underwriter and institution. ABNORMAL_COMMISSIONS × TRANSIENT is a multiplicative slope dummy variable affecting the coefficient on abnormal commissions, calculated by multiplying abnormal commissions by the dummy variable for transient clients. All regressions account for the truncated nature of our dependent variable. *t*-statistics are presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable = ALLOCATION			
Independent Variables	All Institutions		Stable Institutions	Transient Institutions
INTERCEPT	–0.0023***	–0.0021***	–0.0028***	–0.0017***
	(–25.60)	(–24.82)	(–26.07)	(–19.24)
CLIENT_SIZE	0.0449***	0.0443***	0.0429***	0.0531***
	(67.91)	(66.06)	(50.04)	(36.35)
UNDERPRICING	0.0007***	0.0006***	0.0007***	0.0005***
	(19.02)	(19.00)	(13.07)	(13.61)
ABNORMAL_COMMISSIONS	0.0048***	0.0023	0.0032	0.0112***
	(3.01)	(1.26)	(1.41)	(4.81)
TRANSIENT		–0.0003***		
		(5.76)		
ABNORMAL_COMMISSIONS × TRANSIENT		0.0093***		
		(2.58)		
No. of obs.	79,722	79,722	41,794	37,928
Pseudo R^2 %	1.85	2.02	2.06	1.08

after the IPO) are determined by both the size of the client's stable commission payments and transient commissions sent opportunistically to the underwriter.

Our 2nd regression specification includes the dummy variable TRANSIENT and the multiplicative variable ABNORMAL_COMMISSIONS × TRANSIENT. Consistent with Hypotheses 3 and 4, we find a negative and significant coefficient

[35] Since we are now dealing with a dependent variable that represents an institution's trading in a particular stock, rather than brokerage-wide commissions, we do not have the same level of concern regarding overlapping event periods. Thus, we do not present regressions for the sample excluding clustered IPOs in this table. Because the dependent variable (net selling) is truncated at 0, we estimate this regression using a truncated likelihood function.

on TRANSIENT, and a positive and significant coefficient on ABNORMAL_COMMISSIONS × TRANSIENT. Results indicate that transient investors are less likely than stable investors to receive an IPO allocation, consistent with the long-term contracting ideas of Reuter (2006) and Goldstein et al. (2009). However, if a transient institution sends commissions prior to the IPO, the number of shares they receive increases significantly. These results are in accordance with our hypotheses.

We further explore these effects by separating the sample into transient and stable investors. In columns (3) and (4) we find that CLIENT_SIZE is an important determinant of IPO allocations for both transient and stable clients. However, opportunistic short-term abnormal commission payments are much more important for transient investors. In fact, the coefficient on ABNORMAL_COMMISSIONS in the stable institution regression is insignificant (0.0032; *t*-statistic = 1.41), but for transient institutions the coefficient is highly significant (0.0112; *t*-statistic = 4.81). These results provide support for our explanation of how both stable and transient investors can receive IPO allocations, albeit through different mechanisms.

The coefficient on ABNORMAL_COMMISSIONS in Table 8 and our data on IPO profitability allow us to estimate the elasticity accruing to transient institutions that send commissions to the lead underwriter. Using these, we estimate that transient institutions receive approximately $2.21 in IPO profits from allocated shares for each $1 in abnormal commissions sent to the lead underwriter. Sending more commissions to a lead underwriter is therefore a profitable activity for both the transient client and the lead underwriter.

Finally, we examine the allocation of IPOs to transient and stable institutions. Hypothesis 4 maintains that stable institutions receive the majority of IPO allocations, and our allocation estimate confirms this assumption. Of the IPO allocations that go to institutional investors, 76.4% of IPOs are allocated to stable institutions, with transient institutions receiving only 23.6% of our estimated allocations.

VIII. Conclusion

Recent literature suggests that quid pro quo arrangements are of principal importance in IPO allocation decisions. The agency view advocated by Loughran and Ritter (2002), (2004) as well as survey evidence by Jenkinson and Jones (2009) support the idea that lead underwriters allocate lucrative IPO shares to clients who provide them with commission revenues. Reuter (2006) suggests that these institutional clients provide stable streams of commission revenues, whereas NRZ (2007) find circumstantial evidence consistent with investors opportunistically sending transient commission payments to lead underwriters in the period immediately surrounding the IPO offer date.

We find significant increases in lead-underwriter commission revenues during the 10-day period before the most profitable IPOs. For the most profitable IPO quartile, commission revenues increase by 8.49%, and institutions in our sample send abnormal commission payments of $223,510 per IPO. Overall, for the 2 most profitable IPO quartiles, this translates to $93.58 million in excess lead-underwriter commissions that are paid by our sample of institutions. We confirm that these findings are robust to a variety of alternate specifications and cannot be attributed to marketwide changes in trading volume or IPO clustering. Our results are consistent with strategic decisions by some institutions to use commission dollars as a means of obtaining profitable IPO allocations.

Our findings suggest that the institutions in our sample strategically employ a variety of trading strategies to increase lead-underwriter commissions, including increasing round-trip trades, increasing commissions per share, and paying unusually high commissions for some trades. We estimate that commissions from abnormal round-trip trades account for 11% of the total increase in commission revenue for the most profitable IPO quartile. In addition, the average commission paid for all trades in this quartile increases from 4.84¢ per share to 4.90¢ per share, and the frequency of trades paying greater than 10¢ per share goes from 0.47% to 0.67%.

Institutions with stable long-term relationships with underwriters expect to receive IPO allocations as part of their normal business relationship. Alternatively, there exist transient investors who attempt to buy their way into IPO allocations by directing abnormally high commissions to the underwriter in the period immediately surrounding a desirable IPO. Any allocation by the lead underwriter to transient investors reduces the welfare of stable investors, and if detected, stable investors could discipline the underwriter by withholding future commission business. We find that stable institutions, on average, receive more than 75% of the IPO allocation, and that the amount of abnormal commissions paid by institutions to the lead underwriter is inversely related to the concentration of the underwriter's client base. The latter finding is consistent with our assumption that institutions have the ability to discipline underwriters, and this disciplinary mechanism limits the practice of paying for allocations with abnormal commissions.

Finally, our data also allow us to examine whether particular institutions are successful in using commissions to capture IPO profits. Specifically, we investigate whether increased commissions sent to the lead underwriter result in larger allocations of profitable IPOs. We find evidence that stable and transient institutions interact differently with lead underwriters. Our findings indicate that profitable IPO allocations to stable institutions are primarily determined by the long-term commission revenue streams that such institutions provide. Alternatively, excess commissions sent to the lead underwriter in the period immediately preceding the IPO offer date are more important for transient institution allocations. We estimate that $1 of abnormal commission revenue sent by transient institutions to the lead underwriter generates approximately $2.21 in IPO profits from allocated shares. It appears that transient institutions are successful in using commissions to capture excess IPO profits.

References

Amihud, Y. "Illiquidity and Stock Returns: Cross-Section and Time-Series Effects." *Journal of Financial Markets,* 5 (2002), 31–56.

Benveniste, L. M., and P. A. Spindt. "How Investment Bankers Determine the Offer Price and Allocation of New Issues." *Journal of Financial Economics*, 24 (1989), 343–361.

Binay, M. M.; V. A. Gatchev; and C. A. Pirinsky. "The Role of Underwriter-Investor Relationships in the IPO Process." *Journal of Financial and Quantitative Analysis*, 42 (2007), 785–810.

Boehmer, B.; E. Boehmer; and R. P. H. Fishe. "Do Institutions Receive Favorable Allocations in IPOs with Better Long-Run Returns." *Journal of Financial and Quantitative Analysis*, 41 (2006), 809–828.

Brennan, M. J., and T. Chordia. "Brokerage Commission Schedules." *Journal of Finance*, 48 (1993), 1379–1402.

Carter, R., and S. Manaster. "Initial Public Offerings and Underwriter Reputation." *Journal of Finance*, 45 (1990), 1045–1067.

Chemmanur, T. J.; S. He; and G. Hu. "The Role of Institutional Investors in Seasoned Equity Offerings." *Journal of Financial Economics*, 94 (2009), 384–411.

Chemmanur, T., and G. Hu. "Institutional Trading, Allocation Sales, and Private Information in IPOs." Working Paper, Babson College (2007).

Chen, H.-C., and J. R. Ritter. "The Seven Percent Solution." *Journal of Finance*, 55 (2000), 1105–1131.

Corwin, S. A.; J. H. Harris; and M. L. Lipson. "The Development of Secondary Market Liquidity for NYSE-Listed IPOs." *Journal of Finance*, 59 (2004), 2339–2373.

Dennis, P. J., and D. Strickland. "Who Blinks in Volatile Markets, Individuals or Institutions?" *Journal of Finance*, 57 (2002), 1923–1949.

Edwards, A. K., and K. W. Hanley. "Short Selling in Initial Public Offerings." *Journal of Financial Economics*, 98 (2010), 21–39.

Goldstein, M. A.; E. S. Hotchkiss; and E. R. Sirri. "Transparency and Liquidity: A Controlled Experiment on Corporate Bonds." *Review of Financial Studies*, 20 (2007), 235–273.

Goldstein, M. A.; P. Irvine; E. Kandel; and Z. Wiener. "Brokerage Commissions and Institutional Trading Patterns." *Review of Financial Studies*, 22 (2009), 5175–5212.

Hanley, K. W. "The Underpricing of Initial Public Offerings and the Partial Adjustment Phenomenon." *Journal of Financial Economics*, 34 (1993), 231–250.

Hanley, K. W.; C. M. C. Lee; and P. J. Seguin. "The Marketing of Closed-End Fund IPOs: Evidence from Transactions Data." *Journal of Financial Intermediation,* 5 (1996), 127–159.

Irvine, P.; M. Lipson; and A. Puckett. "Tipping." *Review of Financial Studies,* 20 (2007), 741–768.

Jenkinson, T., and H. Jones. "IPO Pricing and Allocation: A Survey of the Views of Institutional Investors." *Review of Financial Studies*, 22 (2009), 1477–1504.

Jones, C., and M. Lipson. "Are Retail Orders Different?" Working Paper, Columbia University (2004).

Lipson, M., and A. Puckett. "Volatile Markets and Institutional Trading." Working Paper, University of Virginia (2007).

Ljungqvist, A., and W. J. Wilhelm Jr. "IPO Pricing in the Dot-Com Bubble." *Journal of Finance*, 58 (2003), 723–752.

Loughran, T., and J. R. Ritter. "Why Don't Issuers Get Upset About Leaving Money on the Table in IPOs?" *Review of Financial Studies,* 15 (2002), 413–443.

Loughran, T., and J. Ritter. "Why Has IPO Underpricing Changed Over Time?" *Financial Management,* 33 (2004), 5–37.

Lowry, M. "Why Does IPO Volume Fluctuate So Much?" *Journal of Financial Economics*, 67 (2003), 3–40.

Lowry, M., and G. W. Schwert. "IPO Market Cycles: Bubbles or Sequential Learning." *Journal of Finance*, 57 (2002), 1171–1200.

Lowry, M., and S. Shu. "Litigation Risk and IPO Underpricing." *Journal of Financial Economics*, 65 (2002), 309–335.

Megginson, W. L., and K. W. Weiss. "Venture Capitalist Certification in Initial Public Offerings." *Journal of Finance*, 46 (1991), 879–903.

Newey, W. K., and K. D. West. "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." *Econometrica,* 55 (1987), 703–708.

Nimalendran, M.; J. R. Ritter; and D. Zhang. "Do Today's Trades Affect Tomorrow's IPO Allocations?" *Journal of Financial Economics*, 84 (2007), 87–109.

Reuter, J. "Are IPO Allocations for Sale? Evidence from Mutual Funds." *Journal of Finance*, 61 (2006), 2289–2324.

Ritter, J. R., and I. Welch. "A Review of IPO Activity, Pricing, and Allocations." *Journal of Finance,* 57 (2002), 1795–1828.

Schwartz, R., and J. Shapiro. "The Challenge of Institutionalization for the Equity Market." In *Recent Developments in Finance*, A. Saunders, ed. Chicago, IL: Irwin Professional Publishing (1992), 31–45.

Smith, R., and C. Bray. "IPO-Abuses Lawsuit Is Settled: Dot-Com-Era Assault on Wall Street Tactics Results in $586 Million Deal." *The Wall Street Journal* (Oct. 7, 2009), C1.

Tinic, S. M. "Anatomy of Initial Public Offerings of Common Stock." *Journal of Finance*, 43 (1988), 789–822.