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Do IPOs Affect Market Price? Evidence from China

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Abstract

We examine whether sizable initial public offerings (IPOs) affect the whole market. Using a Chinese IPO sample, we find robust evidence that sizable IPOs depress the market price on not only the listing day but also the offering (subscription) day. The impact on the market is negatively correlated with IPO size on the listing day. However, this impact is largely transitory. The China Securities Regulatory Commission (CSRC) often places a moratorium on IPOs to support the market, which seems ineffective as the negative IPO effect is transitory and moratoriums are not perceived as good news.

I. Introduction

Whether initial public offerings (IPOs) affect prices of other stocks or whether there is a cross-stock supply effect is an important issue. Braun and Larrain (2009) are the first to examine the cross-stock IPO effect. Using 254 IPOs from 22 emerging markets during the period 1989–2002, they find that IPOs have negative impacts on the prices of stocks that are highly correlated with these IPOs. The authors also point out that if the IPO is large enough, it may affect the whole market price level. We extend that study by examining whether sizable IPOs have a negative impact on the whole market in China.

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Anecdotal evidence shows that IPOs have a negative effect on market price in China. On Nov. 5, 2007, China Oil (PetroChina) was listed on the Shanghai Stock Exchange (SSE) with a trading value of RMB 70 billion, accounting for 45% of total SSE trading value that day. The SSE Composite Index dropped from 5,748 at opening to 5,634 by closing. In addition, Sun, Tong, and Wu (2013) argue that one of the main reasons the Chinese government keeps listing many of its large state-owned enterprises abroad despite the heavy price discount is to divert the large IPO supplies, avoiding a possible negative price effect on the domestic market. Furthermore, the China Securities Regulatory Commission (CSRC) apparently believes that an increased supply of shares depresses market prices, as it has placed many multi-month moratoriums on IPOs[1] following market declines. Also, the split-share reform designed by the CSRC offered compensation to the holders of listed shares for the hypothesized negative price impact from the increase in the public float when non-tradable shares were converted to tradable shares (Lin, Firth, and Zou (2010), Liao, Liu, and Wang (2011)).

The unique institutional setup and characteristics of the Chinese market offer a good setting to conduct an in-depth examination of the new share issuance effect on the whole market. First, although China is the largest and fastest-growing emerging market, with many large IPOs in the past 25 years, the Chinese market has been generally segmented from the rest of the world due to capital controls. Thus, China has a large sample that is mostly unaffected by international portfolio capital flows. In addition, other confounding effects, such as delistings and share repurchases, are negligible.[2]

Second, IPOs in China are subject to heavy speculation. China has one of the highest rates of IPO underpricing in the world, about 113.5%, on average, for the 1990–2014 period.[3] The oversubscription rate of IPO shares is often more than 100 times of the issuing proceeds. This indicates that IPOs in China have captured great attention and locked in a large amount of liquidity. Heavy IPO speculation is likely to have a negative impact on the whole market, not just on their close substitutes.

Third, the Chinese sample allows us to study the IPO effect on the market not only around the listing day but also around the IPO share-offering (subscription) day. Normally, there are several days between the offering day on which subscriptions for IPO shares are submitted and the day investors are notified of share allocations. All subscribers must place in custody the full amount of the value of the shares subscribed during most of our sample period. Hence, a huge amount of

[1]There were still seasoned equity offerings (SEOs) during the moratorium periods, although the SEOs did not increase relative to the non-moratorium period. During out sample period of 1996–2016, there were 6 moratorium periods covering more than 3 years (44 months), about 16.7% of the period. SEO (including rights issues) proceeds during the moratorium periods were less than 14% of total SEO proceeds raised during all these years.

[2]Share repurchasing started in 2009 in China. According to the Wind Database, the total amount repurchased during 2009–2016 is about RMB 61 billion, while IPOs raised more than RMB 2.60 trillion during the same period. Delisting due to bad performance or mergers and acquisitions (M&As) started in 1999. Until the end of 2016, only 90 firms had been delisted. In addition, no management/leveraged buyout for listed firms occurred during the sample period.

[3]See Jay Ritter's Web site (https://site.warrington.ufl.edu/ritter/ipo-data/) for a cross-country comparison. The exact number and ranking may change as the site is periodically updated.

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money associated with oversubscription is frozen during this period. This money can come either from selling stocks in other companies that are already owned or from other sources. If shares are sold, a negative impact on market prices is plausible. However, many investors have a separate fund reserved for IPO subscriptions.[4] Whether an IPO subscription still has a negative impact on the market if a separate fund is set aside is interesting to examine. A more detailed discussion on this will be provided later.

Finally, whether IPOs have a negative impact on the market price has practical policy implications in China. The CSRC placed 9 moratoriums on IPOs during the period 1994–2016, every one following a sharp or prolonged fall in the market price. However, the moratoriums have a significant cost for issuing companies, disrupting their plans to invest and hire people. The repeated moratoriums also foster policy speculation among investors and companies, which may distort the price signal and lead to the misallocation of resources. Thus, whether the moratoriums are beneficial to investors is questionable. Our study sheds some light on this issue. If IPOs have a large and lasting negative effect on the market price, then the moratorium policy may not be unreasonable; otherwise, it may not be necessary.

The CSRC also imposed a 44% first-day return ceiling for IPOs on Jan. 1, 2014. The 44% limit, composed of a temporary trading halt if a 20% price increase occurs, followed by a trading halt for the rest of the day if a further 20% increase occurs, is almost always binding because the CSRC did not permit firms to go public at a price-earnings ratio of above 23 during the 2014–2016 period. This rule may dilute IPO speculation on the listing day and the days immediately before but spread speculation over more days after the listing day. We provide a preliminary test to see whether IPO impact on the market has changed since 2014.

Our study extends Braun and Larrain's (2009) work in several important ways. First, while Braun and Larrain examine the impact of an IPO on its close substitutes based on industry portfolio covariances, we examine how a large IPO may affect the whole market. Second, while they use monthly data, we use daily data, which should measure the IPO cross-stock effect more accurately.[5] Our sample is also larger and covers a longer period of time. Third, while they focus on stock returns, we look further at turnover and order-imbalance differences around the IPO for corroborating evidence. Fourth, we investigate not only the effect surrounding the day an IPO is listed but also surrounding the day of the share subscription that effectively freezes a lot of funds in China. Finally, our study has practical implications, as the CSRC is very concerned about the supply effect of IPOs.

Our main findings are as follows: First, on a day when an IPO representing more than 2% of the last month's average daily trading value is listed,

[4]According to Hexun (http://funds.hexun.com/2015-11-23/180736908.html), a Chinese financial news media Web Site, subscribing to IPO shares has been an important strategy for many Chinese mutual funds. During the first half of 2015, when the market was hot, 475 new unit trusts were established. They raised a total of about RMB 2 trillion, mainly for subscribing to IPO shares. However, when the market crashed in the third quarter, more than half of funds went into the debt market.

[5]Braun and Larrain (2009) use monthly data because many companies in their sample were traded infrequently. This is not the case for Chinese firms, which are traded frequently.

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market return decreases by 0.16% relative to what would be otherwise expected. In addition, a 1% increase in the IPO trading value relative to the market trading value is associated with a 0.03% decrease in market returns on the listing day. However, there is a price reversal of 0.15% the day after the listing. Similarly, order imbalance is statistically significantly negative (the seller-initiated trading value is larger than the buyer-initiated trading value in the market) on the listing day, with a reversal the day after. Second, despite the huge influx of money for IPO subscriptions from sources other than selling existing shares, the IPO subscription still has a statistically significantly negative effect on the market from the day before the share subscription to the end of the frozen period (which is the day investors are notified with share-allocation results), a cumulative decrease of more than 0.53% in abnormal returns. However, this decrease is followed by a strong reversal, 0.40%, on the unfrozen day. In addition, market turnover is statistically significantly lower (higher) during the frozen (unfrozen) period. Finally, we find that the market return does not respond to the CSRC announcements of imposing or lifting IPO moratoriums. Interestingly, the imposition of the first-day IPO return cap at 44% in Jan. 2014 seems to have eliminated the negative IPO impact on the market. No significantly negative price effect on the market was found on the listing day or on the offering day in the subsample test for the period 2014–2016. This indicates that speculation is the main reason for the negative IPO impact on the market. However, no solid conclusion can be made as the sample period is short and the sample size is small.

Our findings are consistent with the price-pressure story that a large supply increase temporarily depresses the price of affected stocks, but they do not lend support to the CSRC's IPO moratorium policy, which is based on the assumption that supply increases have long-lasting effects on the level of stock prices. These findings have theoretical implications for supply shocks, cross-stock price pressure, and substitution between stocks and bank credits as well as practical implications for investors and regulators.

II. Background Information and Data

A. Background Information

China established the Shanghai Stock Exchange in 1990 and the Shenzhen Stock Exchange (SZSE) in 1991. At the end of 2016, the 2 exchanges listed 3,033 firms with a combined total market capitalization of about RMB 48 trillion (roughly USD 6.9 trillion). Individual investors are the main participants in the market. Trading has been heavy, and the annual turnover is often several times that of the NASDAQ.

The IPO issuance mechanism in China has undergone significant changes (Cheung, Ouyang, and Tan (2009)). The government has been heavily involved in the IPO process to "maintain the market order" (see Sun et al. (2013), Shen, Coakley, and Instefjord (2013)). Starting in 1996, all IPO subscription orders were made online with a fixed price. In 1998, to encourage institutional investors to participate in the individual-dominated stock market, the CSRC decided that a certain portion of IPO shares could be set aside for offline subscriptions for institutions, which could participate simultaneously in online subscriptions. In 2000, the

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CSRC further allowed a portion of IPO shares to be set aside offline for existing shareholders (mature investors) in the market.

Once an IPO application is approved,[6] the issuance should be completed within 6 months. Let T be the day the IPO shares are open for online subscription (subscription day or offering day); the issuer must publish the prospectus in the designated newspapers on or before day $T-3$ and then make an issuing announcement on $T-1$. Investors submit their subscription orders for shares on day T. Almost all IPOs during our sample period were oversubscribed, and shares were allocated among investors by drawing lots. For online subscriptions made from 1997 until the end of 2015, investors had to pay in full for all shares they subscribed, and the payment was frozen at the China Securities Registration and Settlement Company from $T+1$ through $T+2$ or $T+3$, when the subscription order was checked and verified. On day $T+3$ or $T+4$, the allocated shares were credited to the investors' accounts, and the funds associated with oversubscriptions were returned to investors. Before Sept. 18, 2006, the frozen period lasted from $T+1$ to $T+3$. The SSE then allowed the frozen period to be shortened by 1 day to $T+2$ at the request of the lead underwriter,[7] while the SZSE required the frozen period to be shortened to 2 days (from $T+1$ to $T+2$) in Aug. 2007 for all IPOs listed on the exchange. Starting from Jan. 2016, there are no frozen funds associated with IPO subscriptions. Investors are allowed to subscribe a certain number of IPO shares based on the average market value of their shareholdings during the past 20 trading days in the SSE and SZSE. In Shanghai, an investor may subscribe 1,000 IPO shares for every RMB 10,000 of tradable stock he or she has. In Shenzhen, the threshold for subscription is lower: RMB 5,000 for 500 shares. Subscribers pay when the lottery results are out, and they only pay for the shares allocated to them. In fact, this was experimented for quite a few IPOs in 2004, too. In 1996, the offering could last for more than 1 day, and the frozen period was also not unified across IPOs.

Offline subscriptions are different from online subscriptions. First, until Sept. 18, 2006, offline subscriptions ended before online subscriptions started. Second, payment was made only when the allocation results were released. Thus, no money was paid and frozen for oversubscription. However, beginning Jan. 21, 2005 and continuing until the end of 2015, offline subscribers had to pay in full for their subscribed shares on the day of the subscription, and the money was frozen until 2 days after. On June 18, 2006, online subscriptions and offline subscriptions were synchronized to the same day. Third, the online oversubscription rate is often more than 100 times the issuing proceeds during our sample period, while the offline rate is usually much lower.

The issuer and the underwriter should file a listing application with the exchange on which the firm intends to list before $T-1$. The median (mean) interval between T, the subscription/offering day, and the listing day is about 9 (24)

[6] Before 2001, an IPO was subject to approval by the CSRC; since 2001, a vote by the IPO issuance and examination committee, which consists of people from the relevant industry and the CSRC, has been required.

[7] Almost all lead underwriters have made such requests.

working days for the whole sample period. Table 1 provides a summary of the IPO subscription and listing process.

TABLE 1
Timeline for IPO Process in China

Table 1 uses the timeline to describe IPO subscription and listing processes in China under different policy regimes. T denotes the day when online investors subscribe to the IPO (i.e., the day that IPO shares are offered for subscription).

Panel A. Subscription

Prospectus	Issuing Announcements	Lottery Results Released	Method	Period	Frozen Day	Unfrozen Day
Vary across IPOs			Online	1996	Vary across IPOs	
On or before $T-3$	On or before $T-1$	$T+2$	Online	1997–Sept. 18, 2006	$T+1$	$T+4$
				Sept. 18, 2006–Dec. 31, 2015	$T+1$	$T+3$
				Jan. 1, 2016–present	n/a	n/a
			Offline	1997–2004	n/a	
				2005–Jan. 21, 2008	$T+1$	$T+2$
				Jan. 22, 2008–Dec. 31, 2015	$T+1$	$T+2$
				Jan. 1, 2016–present	n/a	n/a

Panel B. Number of Working Days between Offering (Subscription) Day and Listing Day

Period	No. of Obs.	Mean	Median
1996–2005	1,011	52.34	14
2006–2016	1,715	7.86	8
1996–2016	2,726	24.36	9

Chinese IPOs have been characterized by very high underpricing. Consequently, almost all issues have been oversubscribed. The lottery rate for getting shares allocated is very low. The China Construction Bank had its IPO on July 16, 2007, and raised RMB 58 billion in proceeds. However, RMB 2.26 trillion in subscription funds were frozen, while the total market capitalization (for tradable shares) in all companies at that time was about RMB 8.5 trillion.[8] It is likely that the whole market trading would be negatively affected even if only a small part of this frozen fund were raised by selling existing shares.

Although the CSRC has been gradually reducing its direct involvement in the IPO process, the government still places a moratorium on IPOs from time to time. Figure 1 shows that the CSRC suspended IPOs 9 times through the end of 2016, all during market downturns or troughs. The first 3 moratoriums happened almost continuously during the period from July 1994 to Jan. 1996. The one that started in 2005 was associated with the stock-split reform that allows non-tradable shares to be tradable. The longest-lasting moratorium started on Nov. 3, 2012, and lasted through Dec. 13, 2013. The last one, started in July 2015, is due to the market crash and ended in Nov. 2015. These suspensions may produce a bias in our investigation as all the trading days during these moratorium periods are counted as normal days. However, our investigation is most likely biased against finding a negative IPO effect on the market. In Jan. 2014, the CSRC further imposed a price cap for the IPO listing day.

[8]The shares of listed companies in China are divided into tradable and non-tradable. Non-tradable shares used to include those held by the government and legal persons that were not allowed to trade and those temporarily locked up. Government shares and legal person shares became tradable after the 2005–2006 share-split reform. After the reform, non-tradable shares refer to shares temporarily locked up for insiders, some institutional investors, etc.

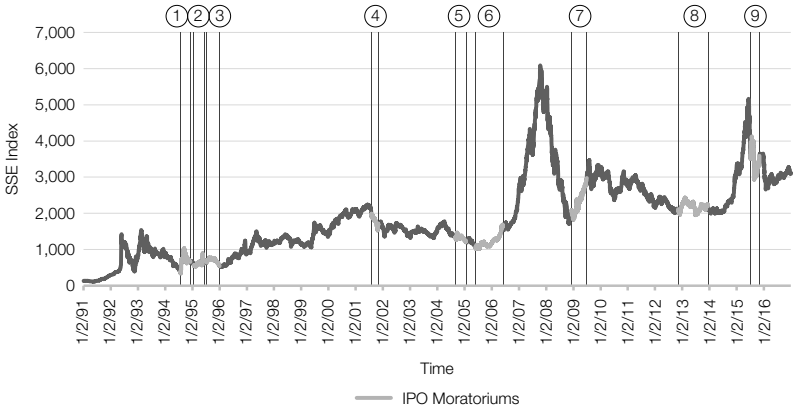
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FIGURE 1

Shanghai Stock Exchange Composite Index and Nine IPO Moratorium Periods (1991–2016)

Figure 1 illustrates the time of 9 moratoriums between 1991 and 2016.



B. Data

We collect all A-share IPO data from the Wind Info (WIND), Beijing Gildata Resset Data Tech Co., Ltd. (RESSET), and China Stock Market and Accounting Research (CSMAR) databases, including subscription date, listing date, issuing size, offering price, frozen fund, frozen fund period, daily stock market return, and individual company trading (high-frequency trading) data. Table 2 presents the summary statistics for all IPOs during our sample period 1996–2016.

TABLE 2

IPO Statistics

Table 2 provides summary statistics for all IPOs issued in China during the period 1996–2016. The number of listed firms, tradable, and total market capitalization are year-end values. Trading value is the annual average of daily trading values. The issuing proceeds, funds frozen, trading value, and market capitalization are RMB in billions. Fund-frozen ratio is defined as the fund frozen divided by the issuing proceeds of an IPO. Average fund-frozen ratio is the average of all individual IPOs' fund frozen ratios. Underpricing is measured from the offer price to the first-day close. Underpricing of 1.94 is 194%. The first-day returns in 2014–2016 are affected by a price-change limit of 44% on the first day of trading.

Year	No. of IPOs	No. of Listed Firms	Avg. Issuing Proceeds	Avg. Frozen Funds	Avg. Fund Frozen Ratio	Trading Value	Tradable Mkt. Cap	Total Mkt. Cap	Mean Underpricing	Min. Underpricing	Median Underpricing	Max. Underpricing	No. of Neg. Underpricing
1996	173	515	0.12	13.36	113.72	8.53	252	951	1.94	−0.15	1.11	27.85	2
1997	190	721	0.31	28.42	104.98	12.47	484	1,718	1.66	−0.65	1.34	18.27	1
1998	94	826	0.41	75.90	241.72	9.54	549	1,917	1.86	0.02	1.23	38.57	
1999	95	924	0.51	75.24	222.66	13.02	789	2,595	1.14	0.07	1.00	8.30	
2000	133	1,061	0.61	183.22	422.38	25.27	1,514	4,664	1.55	0.22	1.42	4.77	
2001	75	1,140	0.76	203.65	428.55	13.88	1,282	4,109	1.55	−0.81	1.34	12.79	1
2002	70	1,207	0.71	428.56	1,323.20	11.46	1,157	3,662	1.50	0.25	1.17	13.56	
2003	67	1,267	0.71	526.97	1,460.68	12.98	1,231	4,147	0.72	0.11	0.70	2.28	
2004	99	1,363	0.34	54.98	247.94	17.12	1,092	3,612	0.70	−0.09	0.56	3.25	3
2005	15	1,366	0.38	7.52	19.97	12.86	879	2,791	0.45	0.03	0.46	1.34	
2006	65	1,418	1.97	208.73	435.26	37.04	2,259	8,524	0.85	0.00	0.75	3.46	
2007	123	1,517	3.88	553.18	870.68	188.06	8,478	31,239	1.91	0.32	1.71	5.38	
2008	76	1,577	1.36	678.98	1,441.35	107.98	4,302	11,826	1.16	0.08	0.84	4.04	
2009	99	1,680	1.90	257.92	269.01	218.68	14,589	23,797	0.74	0.02	0.76	2.10	
2010	347	2,020	1.42	130.55	145.06	224.23	18,789	25,961	0.41	−0.10	0.31	2.75	26
2011	281	2,301	1.01	65.87	95.70	171.70	15,910	20,857	0.21	−0.23	0.14	1.99	77
2012	153	2,456	0.64	42.31	86.11	128.56	17,692	22,528	0.27	−0.26	0.17	6.27	41
2013		2,470				194.98	19,420	23,303					
2014	125	2,592	0.63	72.75	158.47	301.11	30,200	35,667	0.44	0.14	0.44	0.46	
2015	219	2,811	0.72	160.18	332.51	1,040.97	38,771	49,529	0.44	0.44	0.44	0.44	
2016	227	3,033	0.66	n/a	n/a	518.49	37,274	48,176	0.44	0.44	0.44	0.44	
All/Avg.	2,726		0.95	148.87	309.04	156.29			0.89	−0.81	0.45	38.57	151

Several observations are clear. First, the Chinese market grew very fast. The number of listed firms increased from 515 in 1996 to 3,033 in 2016. Correspondingly, the total (tradable share) market capitalization increased from RMB 951 (252) billion to RMB 48 (37) trillion, and the average daily market trading value also increased from RMB 8.53 billion in 1996 to RMB 518 billion in 2016.[9] Second, there were 2,726 IPOs during 1996–2016, but only 151 had negative IPO underpricing, and 144 of the 151 occurred during 2010–2012. This is probably because the CSRC gave issuing firms and their underwriters more freedom to set IPO prices during that period. In addition, the period 2010–2013 coincides with a bear market, which prompted the longest IPO moratorium, from Nov. 2012 to Dec. 2013. As a consequence, there is no IPO listing in 2013. Third, the average IPO underpricing for the whole sample period 1996–2016 is 89%.[10] Fourth, the average amount of frozen funds for an IPO share subscription is usually more than 100 times the average IPO issuing proceeds. Although the subscription rate is lower and some IPO firms had the negative underpricing between 2010 and 2012, IPO speculation was still zealous, as the oversubscription rate was above 85 times IPO issuing proceeds.[11] The average fund-frozen ratio is not applicable for 2016 because the CSRC changed the rule and IPO subscribers only need to pay for shares allocated to them after the lottery results are released. Our sample period starts in 1996 because online subscriptions started that year.

As Braun and Larrain (2009) point out, an IPO must be large before it can have any impact on other stocks.[12] Thus, our sample includes all IPOs with issuing proceeds larger than 2% of the average daily market trading value in the month before the IPO event.[13] This relative size criterion can control for the problems caused by a fast-growing market and inflation during the sample period. As indicated in Table 3, the sample contains 597 IPO listing days (involving 1,121 IPOs) with mean underpricing of 95%. Only 59 IPOs had negative underpricing. One thing worth noting is that our sample during 2014–2016 includes only 6 listing events, despite the fact that there were many IPOs in these years, as shown in Table 2. This is because many IPOs during this period were small in size and listed on ChiNext, while the market capitalization and trading value has been getting larger over the years. In fact, the combined issuing proceeds were likely to meet

[9]The market capitalization here does not include the value of overseas shares listed in Hong Kong and New York, as these markets are totally segmented from the A-share market during our sample period. We also exclude the B-share market in our study because the market is very small. In fact, there have been no B-share IPOs since 1999. During our sample period, the average RMB/USD exchange rate was approximately 7.3 to 1.

[10]This may be underestimated because the CSRC has capped first-day IPO returns at 44% since Jan. 2014.

[11]In fact, a separate test focus on the period 2009–2016 yields qualitatively the same results, although the negative impact on the market is smaller in terms of magnitude. However, the results become insignificant when focusing on the period 2014–2016, after the CSRC imposed the first-day IPO return ceiling.

[12]In other studies, Krasker (1986), Corwin (2003), and Asquith and Mullins (1986) also find that the bigger the SEO size is, the larger the impact on the asset's price.

[13]We use the average market trading value instead of the market capitalization as the denominator because it is related more to liquidity. If there is more than one IPO on the same day, their proceeds are summed. There can be more than one IPO on the listing day, but the corresponding subscription days are likely different.

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TABLE 3

Summary Statistics of the Selected IPO Sample

Table 3 reports the summary statistics for the IPO sample with the issuing proceeds on the listing day larger than 2% of the average daily market trading value in the month before the relevant IPO. The number of IPOs is larger than the number of listing days as more than 1 IPO can be listed on the same day. Issuing proceeds, frozen funds, and trading value are RMB in billions. Trading value is computed as the average daily trading value in the month before the relevant IPO. Fund-frozen ratio is defined as the fund frozen divided by the issuing proceeds of an IPO. Average fund-frozen ratio is the average of all individual IPOs' fund-frozen ratios. Underpricing is measured from the offer price to the first-day close. Underpricing of 1.00 is 100%. First-day returns in 2014–2016 are affected by a price change limit of 44% on the first day of trading.

Year	No. of IPOs	No. of Listing Days	Avg. Issuing Proceeds	Avg. Frozen Funds	Avg. Fund Frozen Ratio	Trading Value	Mean Underpricing	Median Underpricing	No. of Neg. Underpricing
1996	90	50	0.15	14.15	97.13	6.08	1.04	0.82	2
1997	142	70	0.37	31.67	96.76	16.78	1.47	1.26	1
1998	84	49	0.44	79.23	237.22	10.30	1.71	1.20	
1999	86	46	0.53	76.14	214.51	11.75	1.00	0.88	
2000	106	54	0.68	190.93	406.14	24.45	1.43	1.31	
2001	65	55	0.85	213.91	405.03	15.35	1.25	1.19	1
2002	52	52	0.89	459.99	1,231.39	10.60	1.01	1.00	
2003	55	55	0.80	527.85	1,298.81	10.05	0.67	0.50	
2004	62	40	0.36	59.96	265.76	12.24	0.58	0.44	3
2005	9	9	0.52	9.71	18.89	11.86	0.41	0.18	
2006	43	23	2.84	241.96	350.67	38.15	0.70	0.71	
2007	34	17	12.96	1,186.62	722.63	172.01	1.24	1.08	
2008	10	5	7.52	1,467.40	664.34	161.50	0.97	0.79	
2009	40	8	3.56	275.92	131.00	214.37	0.86	0.84	
2010	118	32	2.38	141.21	121.60	192.02	0.30	0.18	16
2011	71	19	1.72	73.13	67.05	190.10	0.13	0.10	20
2012	22	7	1.05	37.08	46.20	136.90	−0.05	−0.08	16
2013									
2014	25	4	0.84	26.23	42.01	176.75	0.42	0.44	
2015	5	1	6.59	684.41	323.66	1550.56	0.44	0.44	
2016	2	1	5.45	n/a	n/a	479.02	0.44	0.44	
All/Avg.	1,121	597	1.48	190.08	318.18	71.67	0.95	0.79	59

our 2% size threshold only when several IPOs were listed on the same day. The cutoff point of 2% of trading value is a bit arbitrary, but we provide robustness checks on this later.

III. Theory and Hypotheses

A. Analytical Framework

The theoretical base of our argument is that a supply shock in terms of a large IPO may crowd out demand for existing stocks in the market. Braun and Larrain (2009) formalize this argument with a theoretical model, based on Grossman and Stiglitz (1980), that assumes that the demand curve for stocks is downward sloping.[14] Their model predicts that the larger the IPO and/or the higher the covariance between the IPO stock and the market, the larger the negative impact on the market price. While Braun and Larrain focus on a portfolio-rebalancing story and thus the covariance, we focus on the IPO issuing size. We argue that when an IPO is large and speculation is zealous, investors may even sell existing stocks other than those that highly covary with the IPO stock. This will directly affect

[14]De Long, Shleifer, Summers, and Waldmann (1990a), (1990b), Shleifer and Vishny (1997), Wurgler and Zhuravskaya (2002), Barberis, Shleifer, and Wurgler (2005), and Marisetty and Subrahmanyam (2010), among others, provide evidence that the demand curves for stocks slope downward.

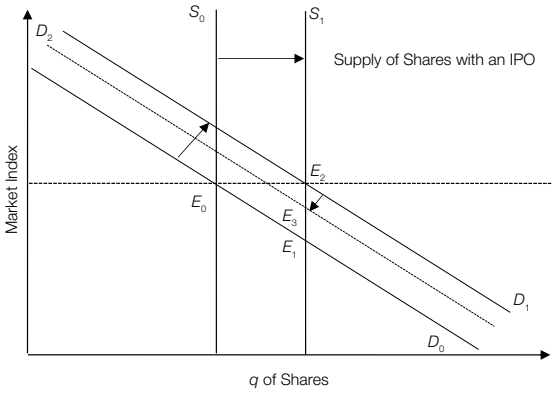
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the whole market. If the price decline is purely due to the portfolio rebalance, then the price decline should be permanent with no reversal; that is, including a new asset in the portfolio is at the expense of existing assets, given that total demand stays the same. However, it is possible that the impact is transitory due to liquidity or behavioral reasons (see Harris and Gurel (1986)). In the case of IPOs, investors may sell existing stocks during the IPO period to buy the new stock, not only for portfolio rebalance but also for speculation (attracted by IPO underpricing). This would cause a downward price pressure for the stocks sold by investors. When liquidity is built up later, these investors buy back the stocks they sold previously, causing a price rebound. This price-pressure story should be relevant to China, as IPO speculation is zealous.

Figure 2 illustrates this point. Assume that the total demand for stocks in the market is D_0 and the total supply of existing stocks is S_0; thus, the initial market equilibrium is at E_0. When there is a sizable IPO, S_0 shifts right to S_1 and investors rebalance their portfolios by selling existing stocks to buy new shares. If the total demand for stocks stays the same, the IPO would depress the market price as the new equilibrium moves along D_0 to E_1. However, when there is a simultaneous increase in the demand for the IPO, the demand curve for the total stocks should shift rightward. It is reasonable to assume that the increase in demand is mainly for the IPO and should not spill over to other stocks in the market in any significant manner. Thus, when all IPO shares are bought with outside funds and nobody sells existing shares, D_0 will shift to D_1, where the new equilibrium price is at E_2, which is on par with E_0, indicating that the IPO has no impact on existing stocks because the increase in supply in terms of the IPO is fully offset by the simultaneous increase in demand for the IPO. However, as IPOs are greatly oversubscribed, it is unlikely that all IPO shares are allocated to the subscribers using only money raised outside the stock market. In addition, even if investors know that their chance of being allocated IPO shares is very small, many may still speculate by selling existing shares to subscribe to IPO shares. Therefore, the

FIGURE 2
Demand and Supply Changes with a Sizable IPO

Figure 2 illustrates the price pressure theory.



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new demand curve for the existing shares plus the new IPO shares, D_2, should lie somewhere between D_0 and D_1. The resulting equilibrium price at E_3 should be lower than E_0. This means that although there is a simultaneous increase in demand for new shares, a sizable IPO can still depress the market price. If some of the money, such as the funds unfrozen after the IPO subscription, is invested back into the existing stocks, we should see a price reversal, as D_2 should move toward D_1 after the IPO subscription or listing.

B. Empirical Predictions

We focus on two important events in the IPO process: the subscription day (T), when investors submit their share subscriptions, and the listing day (LD), when investors are able to trade the IPO shares on the stock exchange. The IPO impact on the market is most likely to occur during short periods surrounding these 2 event days.

Many Chinese investors have set aside a fund specifically for IPO subscriptions. The existence of such reserved funds leads to an influx of money to subscribe IPO shares other than from selling existing shares. Prior research on supply shocks implicitly assumes that the total demand for the relevant assets stays roughly the same at least for a short period; therefore, the price change of these stocks is mainly due to the supply shock (Braun and Larrain (2009), Meidan (2005)). The simultaneous increase in demand for IPOs in China due to the existence of reserved funds around the IPO subscription event complicates the study. However, based on our analysis, illustrated in Figure 2, we should still find a negative IPO impact on the market as long as the increase in demand for the IPO does not spill over to other stocks in any significant way. Since it is impossible that all investors have set aside enough money to speculate on the IPO, a portion of the total subscription money must be still raised by selling existing shares. This portion need not be large relative to the total amount of money frozen, but it should be large relative to the daily market trading value.

To the extent that a significant portion of the subscription fund is raised by selling existing shares in the market, the market return on days T and immediately before T may be negatively affected. In addition, we should observe higher seller vis-à-vis buyer-initiated trading value on days T and immediately before T than on ordinary days. Since day T is usually set and announced only 3 days before the offering, we set the pre-offering window from $T-2$ to $T-1$ and believe that the selling activities are largely concentrated in this window and on day T.[15] However, total turnover may not decrease, as the drop in the buyer-initiated trading value can be more than offset by the increase in the seller-initiated trading value.

All the online (and offline after 2006) subscription money was frozen from the beginning of 1997 until the end of 2015 from $T+1$ to $T+2$ or $T+3$, at which point it was returned to the investors. During this period, trading activities on other stocks were likely to decrease. Thus, the market turnover from $T+1$ to $T+2$ (or $T+3$) should be lower than that on ordinary days, when there is

[15]The prospectus is published in the newspaper on or before day $T-3$. It is reasonable to assume that an IPO becomes more certain after the prospectus is published. More investors start to speculate about the IPO after reading the prospectus.

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no IPO subscription or listing. The reduction in liquidity should possibly lead to lower market returns on these days, too. On $T+3$ (or $T+4$), investors had more liquidity and started to buy back the shares they had sold previously, causing a rebound in turnover and the market price. If this is the case, we should also see higher buyer vis-à-vis seller-initiated trading value on $T+3$ (or $T+4$) and immediately after than on ordinary days.

This analysis suggests that the IPO impact surrounding the offering day should be consistent with the price-pressure story, as the impact is more related to speculation and liquidity shortage than to portfolio rebalance based on substitution. With high uncertainty in regard to actually getting IPO shares, and uncertainty about the price of IPO shares in the secondary market, not many investors would rebalance their portfolio around day T. In other words, the IPO impact on T should be largely determined by IPO size, not the covariance between the IPO stock and the market.

LD is another important event day, as investors can actually trade IPO shares. Speculators can buy IPO shares and then cash out on the high first-day initial return, while other investors can rebalance their portfolios by selling existing stocks that highly covary with the IPO on or before LD and buy shares of the listing stock on LD. With the downward-sloping demand curve for stocks, such selling activities should depress the market price (excluding IPO shares) on LD and the days immediately before. The trading volume (excluding IPO shares) may not be reduced on these days, but we should observe a higher seller-initiated trading value on these days than on ordinary days. If the market price change is mainly due to the portfolio rebalance, we should not see much price reversal after LD. However, if temporary price pressure due to speculation or liquidity shortage also exists, which is very likely, we should observe a price reversal and a higher buyer-initiated trading value after LD.

It is also logical to argue that the drop in market price and order imbalance on LD and the reversal thereafter (if any) should be positively related to the IPO size, while the drop in market price and order imbalance on the offering day and the possible reversal on the fund unfrozen day should, to a lesser extent,[16] be positively related to the size of the frozen funds or unfrozen funds. Similarly, the possible decrease in turnover during the frozen period and the reversal afterward should be positively related to the size of the fund frozen or unfrozen.

Table 4 defines the relevant testing periods. There is no ambiguity surrounding the offering (subscription) day (OD), frozen period (FP), or listing day (LD). However, it is arguable how many days should be included in the pre-offering period (PRE_O), unfrozen period (UFP), pre-listing period (PRE_L), and post-listing period (POST_L). Thus, we give two alternative definitions: either 1 day or 2 days. All other days are defined as ordinary days. For IPO subscriptions without funds frozen (in both 2004 and 2016),[17] we treat the offering day as a normal day. The result is much the same if we use as the OD the day that investors pay for

[16] We do not know whether the amount of money raised by selling existing shares is really proportional to the frozen funds.

[17] There are 42 IPOs in 2004 and 2 in 2016 that do not have frozen funds associated with subscription; we treat these offering days as normal days. Many of these IPOs share a common listing day.

TABLE 4
Event Periods

Table 4 defines the event periods used in the empirical analysis. The pre-offering period, unfrozen period, pre-listing period, and post-listing period each have two alternative definitions.

Period	Definitions
PRE_O	Pre-offering period: The day before the public offering [$T-1$] or 2 days before the public offering [$T-2$, $T-1$].
OD	Offering day: The online public subscription day [T].
FP	Frozen period: The day after the offering day to the day before the unfrozen day [$T+1$, UFP $-$ 1].
UFP	Unfrozen period: The day the oversubscription fund is returned to investors [UFP] or a 2-day period [UFP, UFP + 1].
PRE_L	Pre-listing day: The day before listing [LD $-$ 1] or 2 days before listing [LD $-$ 2, LD $-$ 1].
LD	Listing day: The day the IPO shares get listed.
POST_L	Post-listing day: The day after the listing [LD + 1] or 2 days after the listing [LD + 1, LD + 2].
OTHERD	Other trading days: OTHERD1 and OTHERD2 correspond to 1- or 2-day definition for PRE_O, UFP, PRE_L, and POST_L, respectively.

their allocated shares. For IPOs issued in 1996, the share subscription can last for a few days, and the fund-frozen period is not unified across IPOs. Since we can only identify the offering starting day but not ending day in the database, we treat OD, FP, and UFP for 1996 observations the same as those offerings occurring during the 1997–2015 period. However, results are much the same when we omit all 1996 observations.[18]

Table 5 further presents the statistics of the frozen and unfrozen fund ratios, the issuing ratio, and the listing-day IPO trading ratio. The frozen (unfrozen) ratio is the frozen (unfrozen) fund associated with an IPO subscription divided by the average daily market trading value from $T-2$ to T, while the listing-day IPO trading ratio and the IPO issuing ratio are the IPO trading value and IPO issuing proceeds divided by the total market trading value excluding IPO shares on the listing day, respectively. Notice that the frozen ratio here is different from the frozen ratio reported in Tables 2 and 3. The denominator is not an IPO's issuing proceeds but the whole market trading value, excluding IPO shares. The mean frozen ratio is about 17.8 times the average daily trading value on and right before the share subscription. Assuming all the IPO subscription money is raised from the stock market, it would take, on average, about 18 days for investors to raise enough money even if sellers initiated all the trades in the market. Similarly, the mean unfrozen ratio of 17.7 indicates that even if buyers initiated all trades, it would take, on average, more than 17 days to return all unfrozen funds to the market. Such scenarios are highly unlikely. Thus, investors must reserve a huge amount of money in order to speculate on IPO shares. It is interesting to see whether the IPO subscription still produces a negative impact on the market given the huge influx of such reserved funds. On the other hand, the mean IPO issuing ratio is about 8.5% of the RMB value of trading in other stocks, while the IPO trading ratio is about 7.2%. Such magnitudes are likely to crowd out some of the trading for other stocks in the market on the listing day. Notice that there are more observations for the frozen and unfrozen ratios than for the issuing and IPO trading ratios despite the fact that quite a few IPOs in 1996, 2004, and 2016 do not have an offering day associated with fund frozen. This is because there can be 2 or more IPOs on the same listing day, but their offering days are different.

[18] See Panel C of Table A9 in the Internet Appendix.

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TABLE 5
Size Measures (1996–2016)

Table 5 presents the summary statistics of the four size measures. The frozen (unfrozen) ratio is the frozen (unfrozen) funds associated with the share subscription divided by the average daily market trading value of days $T-2$, $T-1$, and T. Notice that this frozen ratio is different from the frozen ratio computed in Tables 2 and 3. The denominator here is the average daily market trading value instead of IPO issuing proceeds. A frozen ratio of 17.77 indicates the fund frozen is 17.77 times the daily market trading value. The issuing ratio is the IPO proceeds divided by the IPO day market trading value (excluding the IPO trading value). IPO trading ratio is the total trading value of the IPO shares on the listing day divided by the market trading value (excluding the IPO shares). Both issuing ratio and IPO trading ratio are percentages. An IPO trading ratio of 7.16 indicates that the trading value of IPO shares on the listing day is 7.16% of the market trading value (excluding the IPO shares). All measures are winsorized at the 1% and 99% levels.

Variable	No. of Obs.	Mean	Min.	Median	Max.	Std. Dev.
Frozen ratio	651	17.768	0.149	7.444	121.749	23.935
Unfrozen ratio	651	17.700	0.133	7.396	121.685	23.914
Issuing ratio (%)	597	8.537	1.053	5.070	76.053	11.216
IPO trading ratio (%)	597	7.163	0.467	5.270	49.739	7.284

IV. Empirical Analysis

A. Summary Statistics for Market Impact Measures

We examine whether various event periods, as defined in Table 4, have any abnormal average daily market (excluding the current IPO firm) returns. As there is no combined market index for all shares listed on the SSE and the SZSE, we use the SSE Composite Index return as the proxy for the whole market return.[19] We further use daily market turnover and order imbalance to measure the possible IPO impact on the market. Market turnover is defined as the total market trading value divided by the total market capitalization (tradable shares), while order imbalance is constructed from high-frequency data. Following Lee and Ready (1991), we first classify all trades as buyer initiated or seller initiated. If a trade is completed at a price below the midpoint of the relevant bid–ask spread, the trade is considered a seller-initiated trade; otherwise, the trade is a buyer-initiated trade. Then order imbalance is defined as

$$2(\text{BUY} - \text{SELL})/(\text{BUY} + \text{SELL}), \tag{1}$$

where BUY is the total value of buyer-initiated trades in the market on a particular day and SELL is the total value of seller-initiated trades in the market on the same day. A positive (negative) order imbalance indicates that there is a higher (lower) buyer-initiated trading value compared to seller-initiated trading value on that day. As the high-frequency data are available only from 2003 to 2012, the sample period for the test using order-imbalance data is 2003–2012 instead of 1996–2016. The IPO shares are excluded in the computation of turnover and order imbalance on the listing day and the day after.

Panels A, B, and C of Table 6 present the summary statistics for the average daily market return, turnover, and order imbalance, respectively, over the relevant testing periods defined in Table 4. Turnover and order imbalance are winsorized at the 1% and 99% levels. The stock return is not winsorized as it is subject

[19] The SSE Composite Index is a value-weighted index containing all shares listed on the SSE. IPO shares are not included in the index until 2 days after they are listed. During our sample period, the correlation coefficient between the SSE and SZSE Composite Index returns is 0.90.

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TABLE 6

Summary Statistics on Market Return, Turnover, and Order Imbalance over Various Event Periods

Table 6 presents the summary statistics for the three market impact measures (average daily market return, average daily turnover, and average daily order imbalance) over the relevant testing periods defined in Table 4. Market return is the SSE Composite Index return. Turnover is the market trading value divided by the total market capitalization (tradable shares). Order imbalance is defined as {2(BUY − SELL)/(BUY + SELL)}, that is, the total value of buyer-initiated trades minus the total value of seller-initiated trades divided by half of all trading value on a particular day in the market. Turnover and order imbalance are winsorized at the 1% and 99% levels. IPO firms are excluded in the computation of these measures. The sample period for the order-imbalance measure is shorter due to data availability. All the return, turnover, and order-imbalance measures are percentages.

Period	Days Included	No. of Obs.	Mean	Min.	Median	Max.	Std. Dev.
Panel A. Average Daily Return in Percentages (1996–2016)							
PRE_O	[$T-1$]	651	0.05	−8.83	0.08	8.42	1.77
	[$T-2$, $T-1$]	1,126	0.02	−8.83	0.04	8.87	1.74
OD		651	−0.11	−8.83	−0.08	8.87	1.72
FP		1,419	−0.05	−8.83	−0.01	6.98	1.66
UFP	[UFP]	652	0.34	−7.19	0.36	6.98	1.64
	[UFP, UFP + 1]	1,128	0.21	−7.19	0.21	9.25	1.70
PRE_L	[LD − 1]	597	−0.07	−8.83	0.01	9.29	1.74
	[LD − 2, LD − 1]	1,080	0.04	−8.91	0.05	9.29	1.72
LD		597	−0.12	−8.83	−0.09	8.42	1.69
POST_L	[LD + 1]	597	0.16	−7.61	0.12	8.21	1.66
	[LD + 1, LD + 2]	1,080	0.16	−8.36	0.11	9.25	1.68
OTHERD1		2,523	0.08	−9.91	0.09	9.86	1.76
OTHERD2		2,231	0.05	−9.91	0.07	9.86	1.73
Overall		5,090	0.05	−9.91	0.07	9.86	1.72
Panel B. Average Daily Turnover in Percentages (1996–2016)							
PRE_O	[$T-1$]	651	2.03	0.42	1.45	7.31	1.64
	[$T-2$, $T-1$]	1,126	1.98	0.42	1.39	7.31	1.62
OD		651	2.01	0.42	1.39	7.31	1.65
FP		1,419	1.86	0.42	1.29	7.31	1.55
UFP	[UFP]	652	1.98	0.42	1.41	7.31	1.59
	[UFP, UFP + 1]	1,128	1.94	0.42	1.37	7.31	1.57
PRE_L	[LD − 1]	597	1.78	0.42	1.22	7.31	1.53
	[LD − 2, LD − 1]	1,080	1.79	0.42	1.23	7.31	1.54
LD		597	1.76	0.42	1.25	7.31	1.51
POST_L	[LD + 1]	597	1.76	0.42	1.20	7.31	1.49
	[LD + 1, LD + 2]	1,080	1.79	0.42	1.24	7.31	1.51
OTHERD1		2,523	1.84	0.42	1.46	7.31	1.21
OTHERD2		2,231	1.83	0.42	1.47	7.31	1.17
Overall		5,090	1.82	0.42	1.38	7.31	1.36
Panel C. Average Daily Order Imbalance in Percentages (2003–2012)							
PRE_O	[$T-1$]	222	0.41	−35.04	1.20	44.84	14.45
	[$T-2$, $T-1$]	401	1.09	−35.04	1.13	44.84	15.54
OD		224	0.29	−35.04	0.35	44.84	14.62
FP		461	0.09	−35.04	0.15	44.84	15.69
UFP	[UFP]	225	1.73	−35.04	0.74	44.84	15.34
	[UFP, UFP + 1]	404	1.37	−35.04	1.09	44.84	15.12
PRE_L	[LD − 1]	211	−0.02	−35.04	−0.00	44.84	17.01
	[LD − 2, LD − 1]	390	0.84	−35.04	0.55	44.84	16.52
LD		214	−3.12	−35.04	−3.51	44.84	17.46
POST_L	[LD + 1]	214	2.67	−35.04	2.59	44.84	17.28
	[LD + 1, LD + 2]	393	1.83	−35.04	1.93	44.84	17.04
OTHERD1		1,344	1.10	−35.04	1.33	44.84	14.19
OTHERD2		1,156	0.91	−35.04	1.18	44.84	14.16
Overall		2,403	0.81	−35.04	1.05	44.84	14.92

to the daily price-change limit of 10% in either direction. The mean (median) daily market return on the offering day is −0.11% (−0.08%), much lower than the corresponding mean (median) return of 0.08% (0.09%) on an ordinary day (OTHERD1). There is also a strong reversal of 0.34% (0.36%) on the unfrozen day. A similar pattern can be observed around the listing day. The mean (median) return is −0.12% (−0.09%) on the listing day, and there is a strong reversal of

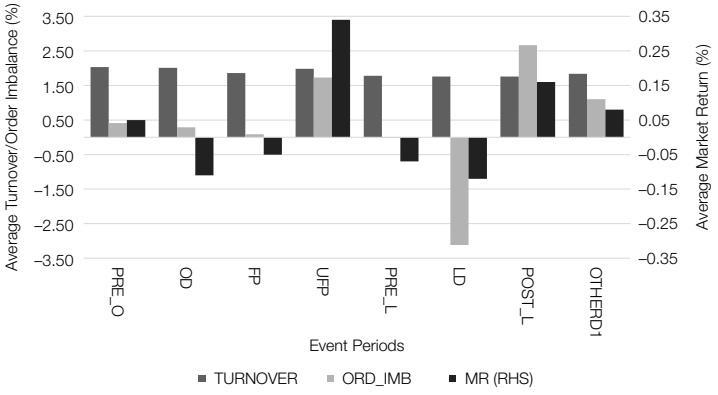
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0.16% (0.12%) the next day. In addition, order imbalances on the offering day and the listing day are much lower than that on an ordinary day, followed by a reversal on the unfrozen day and the post-listing day. Furthermore, market turnover is lower during the frozen period than on the unfrozen day.

On the whole, the pattern shown in Table 6 seems consistent with the price-pressure story; that is, an IPO has a negative impact on the market, but the impact is transitory. It also seems to suggest that the share subscription has a negative impact on the market, even with a huge influx of speculative money focused on the IPO. Figure 3 further illustrates the pattern for the return, turnover, and order imbalance surrounding the offering and listing days.

FIGURE 3
Average Market Return, Turnover, and Order Imbalance over Various Event Periods
(PRE_O, UFP, PRE_L, and POST_L are defined as 1-day periods)

Figure 3 illustrates the average market return, turnover, and order imbalance over the relevant testing periods defined in Table 4.



B. Regression Analyses of IPO Effect on the Market

Many studies demonstrate that the generalized autoregressive conditional heteroscedasticity or GARCH (1, 1) model is a parsimonious representation of stock market return dynamics (see Bollerslev (1986), Engle (2001), and Apolinario, Santanta, Sales, and Caro (2006)). We use the following GARCH-in-mean model to test how a sizable IPO would impact the market return surrounding the offering and listing days:

$$
\begin{aligned}
(2) \qquad \mathrm{MR}_t &= \alpha_0 + \alpha_1 \mathrm{MR}_{t-1} + \alpha_2 \mathrm{PRE_O} + \alpha_3 \mathrm{OD} + \alpha_4 \mathrm{FP} \\
&\quad + \alpha_5 \mathrm{UFP} + \alpha_6 \mathrm{PRE_L} + \alpha_7 \mathrm{LD} + \alpha_8 \mathrm{POST_L} + \alpha_9 h_t + \varepsilon_t, \\
h_t &= \beta_0 + \beta_1 h_{t-1} + \beta_2 \varepsilon_{t-1}^2,
\end{aligned}
$$

where MR_t is the market return on day t and h_t is the variance of ε_t conditional upon the information set φ at time $t-1$ and is modeled following an autoregressive moving average, or ARMA (1, 1) process, which is a proxy for time-varying market risk. The lag return term is added to the mean equation to filter out the

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possible first-order serial correlation in the return series; PRE_O, OD, FP, UFP, PRE_L, LD, and POST_L are dummy variables for the pre-offering period, offering day, frozen period, unfrozen period, pre-listing period, listing day, and post-listing period, respectively, defined in Table 4; and ε_t is the residual. If the IPO subscription depresses the market return, α_2 and/or α_3 should be negative. If the frozen subscription funds affect the market, α_4 should be negative, while α_5 should be positive. Similarly, if the listing depresses the market temporarily, α_6 and/or α_7 should be negative, while α_8 should be positive.

Because there is no established empirical model for the process of generating turnover or order imbalances, we use the following ordinary least squares (OLS) models for our tests:[20]

$$\begin{aligned}(3)\quad \text{TURNOVER}_t &= \alpha_0 + \alpha_1 \text{TURNOVER}_{t-1} + \alpha_2 \text{PRE_O} + \alpha_3 \text{OD} \\ &\quad + \alpha_4 \text{FP} + \alpha_5 \text{UFP} + \alpha_6 \text{PRE_L} + \alpha_7 \text{LD} + \alpha_8 \text{POST_L} + \text{YEAR} + \varepsilon_t,\end{aligned}$$

$$\begin{aligned}(4)\quad \text{ORD_IMB}_t &= \alpha_0 + \alpha_1 \text{ORD_IMB}_{t-1} + \alpha_2 \text{PRE_O} + \alpha_3 \text{OD} + \alpha_4 \text{FP} \\ &\quad + \alpha_5 \text{UFP} + \alpha_6 \text{PRE_L} + \alpha_7 \text{LD} + \alpha_8 \text{POST_L} + \text{YEAR} + \varepsilon_t,\end{aligned}$$

where TURNOVER_t and ORD_IMB_t are market turnover and market order imbalance on day t, respectively; year dummies are created for each calendar year in the sample to control for the time-specific effect; and other variables are as defined in equation (2). If the frozen subscription funds affect market turnover, α_4 should be negative, while α_5 should be positive in equation (3). If investors sell existing stocks to subscribe IPO shares, α_2 and/or α_3 should be negative in equation (4), and if the unfrozen subscription funds are reinvested in the market, α_5 should be positive. Similarly, if investors sell existing stocks to buy IPO shares on or before the listing day either for portfolio rebalance or for speculation, α_6 and/or α_7 should be negative. If many speculators cash out the IPO shares at the end of the first day and buy back other stocks the next day, α_8 should be positive.

The regression results of equations (2)–(4) for the whole sample period are reported in Panel A of Table 7. As there are two alternative definitions for the PRE_O, UFP, PRE_L, and POST_L periods (see Table 4), two regression results are presented for equations (2)–(4), respectively. Columns 1, 3, and 5 define the PRE_O, UFP, PRE_L, and POST_L periods as 1-day dummies, while columns 2, 4, and 6, defined them as 2-day dummies. Our interpretations focus on the 1-day dummy results, as the results for the 2-day dummy are qualitatively the same.

The results in column 1 of Panel A of Table 7 clearly indicate that IPOs have a statistically significantly negative impact on market returns. The estimated coefficients for PRE_O, OD, and FP are −0.11, −0.14, and −0.14, respectively, indicating a cumulative abnormal return from the day before the offering to the end of the frozen period of about −0.53% to −0.67% (notice the frozen period in our sample period varies from 2 to 3 days).[21] The corresponding t-values are statistically significant at the 10% and 1% levels, respectively. However, there is

[20] French (1980) and Smirlock and Starks (1986) use the standard ordinary least squares method to assess the day-of-the-week effect in the returns.

[21] $(-0.11) + (-0.14) + (-0.14) \times (2 \text{ or } 3) = -0.53$ or -0.67.

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a strong return reversal of 0.40% on the unfrozen day, which is significant at the 1% level. For the listing event, the estimated coefficients for PRE_L and LD are −0.10 and −0.16, which are significant at the 10% and 1% levels, respectively,

TABLE 7
IPO Impact on the Market

Table 7 reports the regression results for the following GARCH and OLS models:

$$(2)\quad \mathrm{MR}_t = \alpha_0 + \alpha_1 MR_{t-1} + \alpha_2 \mathrm{PRE_O} + \alpha_3 \mathrm{OD} + \alpha_4 \mathrm{FP} + \alpha_5 \mathrm{UFP} + \alpha_6 \mathrm{PRE_L} + \alpha_7 \mathrm{LD} + \alpha_8 \mathrm{POST_L} + \alpha_9 h_t + \varepsilon_t,$$

$$h_t = \beta_0 + \beta_1 h_{t-1} + \beta_2 \varepsilon_{t-1}^2,$$

$$(3)\quad \mathrm{TURNOVER}_t = \alpha_0 + \alpha_1 \mathrm{TURNOVER}_{t-1} + \alpha_2 \mathrm{PRE_O} + \alpha_3 \mathrm{OD} + \alpha_4 \mathrm{FP} + \alpha_5 \mathrm{UFP} + \alpha_6 \mathrm{PRE_L} + \alpha_7 \mathrm{LD} + \alpha_8 \mathrm{POST_L} + \mathrm{YEAR} + \varepsilon_t,$$

$$(4)\quad \mathrm{ORD_IMB}_t = \alpha_0 + \alpha_1 \mathrm{ORD_IMB}_{t-1} + \alpha_2 \mathrm{PRE_O} + \alpha_3 \mathrm{OD} + \alpha_4 \mathrm{FP} + \alpha_5 \mathrm{UFP} + \alpha_6 \mathrm{PRE_L} + \alpha_7 \mathrm{LD} + \alpha_8 \mathrm{POST_L} + \mathrm{YEAR} + \varepsilon_t,$$

where MR_t, $\mathrm{TURNOVER}_t$, and $\mathrm{ORD_IMB}_t$ are market return, market turnover, and market order imbalance on day t, respectively; PRE_O, OD, FP, UFP, PRE_L, LD, and POST_L are the various testing periods defined in Table 4; h_t is the variance of ε_t conditional upon the information set φ at time $t-1$ and is modeled following an ARMA (1, 1) process, which is a proxy for the time-varying market risk; YEAR dummies are used to control for the time-specific effect; and ε_t is the residual on day t. Panels A and B present the regression results for the whole sample period (1996–2016) and the subsample period (2014–2016), respectively. There are two alternative definitions for testing periods PRE_O, UFP, PRE_L, and POST_L. All return, turnover, and order-imbalance measures are percentages. Columns 1, 3, and 5 indicate the 1-day window and columns 2, 4, and 6 the 2-day window. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. 1996–2016

	Market Return		Turnover		Order Imbalance	
Variables	1	2	3	4	5	6
Mean Equation						
PRE_O	−0.11*	−0.11**	−0.04*	−0.02	−1.23	−0.55
	(−1.87)	(−2.36)	(−1.66)	(−1.20)	(−1.25)	(−0.66)
OD	−0.14***	−0.15***	−0.02	−0.02	−1.17	−1.33
	(−2.60)	(−2.80)	(−0.99)	(−1.04)	(−1.15)	(−1.31)
FP	−0.14***	−0.13***	−0.05***	−0.05***	−2.24***	−2.24***
	(−3.17)	(−2.99)	(−3.14)	(−3.05)	(−2.67)	(−2.67)
UFP	0.40***	0.41***	0.06***	0.06***	0.23	0.18
	(7.11)	(7.13)	(2.76)	(2.66)	(0.23)	(0.18)
PRE_L	−0.10*	−0.03	−0.01	−0.01	−1.53	−0.45
	(−1.87)	(−0.70)	(−0.43)	(−0.62)	(−1.28)	(−0.49)
LD	−0.16***	−0.16***	−0.03	−0.04	−5.06***	−5.07***
	(−2.94)	(−2.92)	(−1.52)	(−1.52)	(−4.24)	(−4.23)
POST_L	0.15***	0.15***	−0.01	−0.01	2.19*	2.18*
	(2.72)	(2.79)	(−0.56)	(−0.59)	(1.79)	(1.79)
Lag Dep.	0.02	0.02	0.90***	0.90***	0.04*	0.04*
	(1.12)	(1.11)	(86.84)	(86.65)	(1.92)	(1.86)
Const.	0.03	0.03	0.48***	0.48***	7.85***	7.70***
	(0.98)	(1.03)	(6.46)	(6.46)	(5.59)	(5.35)
h_t	0.02*	0.02*				
	(1.78)	(1.77)				
Variance Equation						
ARCH (1)	0.08***	0.08***				
	(21.04)	(20.97)				
GARCH (1)	0.91***	0.91***				
	(267.00)	(265.37)				
Constant	0.03***	0.03***				
	(8.43)	(8.55)				
No. of obs.	5,090	5,090	5,089	5,089	2,385	2,385
R^2			0.90	0.90	0.09	0.08
Q(12)	46***	46***				
Q(24)	99***	99***				

(continued on next page)

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TABLE 7 (continued)
IPO Impact on the Market

Panel B. 2014–2016

	Market Return		Turnover	
Variables	1	2	3	4
Mean Equation				
PRE_O	−0.63	−0.52	−0.16***	−0.06
	(−0.55)	(−0.63)	(−3.15)	(−0.90)
OD	0.07	−0.13	0.03	−0.05
	(0.07)	(−0.14)	(0.56)	(−0.82)
FP	−0.39	−0.25	−0.09	−0.06
	(−0.55)	(−0.37)	(−1.61)	(−1.39)
UFP	0.77	0.80	0.08	0.06
	(0.73)	(0.71)	(1.28)	(1.12)
PRE_L	0.24	0.19	0.08	0.06
	(0.47)	(0.37)	(0.65)	(0.92)
LD	0.08	0.06	−0.08	−0.07
	(0.12)	(0.08)	(−1.30)	(−1.08)
POST_L	0.10	0.16	0.06	0.07
	(0.10)	(0.18)	(0.39)	(0.46)
Lag Dep.	0.04	0.04	0.85***	0.85***
	(1.01)	(1.02)	(28.70)	(28.68)
Const.	0.09	0.09	0.21***	0.21***
	(1.56)	(1.54)	(6.07)	(6.03)
h_t	−0.01	−0.01		
	(−0.44)	(−0.43)		
Variance Equation				
ARCH (1)	0.07***	0.07***		
	(7.53)	(7.53)		
GARCH (1)	0.93***	0.93***		
	(127.22)	(128.01)		
Constant	0.01**	0.01**		
	(2.05)	(2.04)		
No. of obs.	733	733	732	732
R^2			0.86	0.86
Q(12)	39***	38***		
Q(24)	95***	93***		

indicating that the market price drops 0.1% on the prelisting day and 0.16% on the listing day. However, the market return bounces back by 0.15% on the post-listing day, which is also significant at the 1% level. Given that the transaction cost plus stamp duty is no more than 0.35% for a round trip in the late half of our sample period, the IPO impact on the market return is also economically significant. As a robustness check, we replace the SSE Composite Index return with the value-weighted market return (computed by ourselves), which includes all firms listed on the SSE and the SZSE. The results are qualitatively the same (see Table A1 in the Internet Appendix, available at http://www.jfqa.org).

The results in column 3 of Panel A of Table 7 indicate that the average daily market turnover decreases about 0.05% during the frozen period but bounces back 0.06% on the unfrozen day, both of which are significant at the 1% level. This is consistent with the general perception that the huge amount of funds frozen due to the IPO share subscription reduces trading activities. Once the funds are unfrozen, the market turnover bounces back. As the ordinary daily turnover is about 1.84% (see Panel B of Table 6), a change of 0.05% is economically significant, representing about a 2.5% decrease from normal turnover.

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The results in column 5 of Panel A in Table 7 further show that there is a lower buyer-initiated vis-à-vis seller-initiated trading value on the listing day but a higher buyer-initiated vis-à-vis seller-initiated trading value on the days after the listing. Specifically, there is a 5.06% decrease in order imbalance on the listing day that is significant at the 1% level and a 2.19% rebound on the post-listing day (the mean order imbalance on an ordinary day is 1.10% and the range is from −35% to 45%, as shown in Panel C of Table 6), which is significant at the 10% level. This is consistent with the price reversal documented in column 1. However, we do not see an obvious pattern of order imbalance around the offering day except that it is −2.24% during the frozen period, which is significant at the 1% level.

Overall, results in Panel A of Table 7 strongly suggest that a sizable IPO has a temporary negative impact on the market, not only around the IPO listing day but also around the IPO offering day, despite a huge influx of money from outside the stock market to speculate on the IPO subscription. This indicates that many investors sell existing shares to raise money for the IPO subscription. The frozen fund for the IPO subscription also lowers turnover and order imbalance in the frozen period. These results are also consistent with the liquidity or price-pressure story and the observation that the Chinese market is highly speculative.

As mentioned earlier, the CSRC imposed a 44% cap for the first-day IPO return from Jan. 1, 2014 to curb IPO speculation. From the second day onward, the IPO shares are subject to the same daily price movement limit of 10% as all other existing shares in the market. Although this 44% first-day return cap may not really decrease the IPO initial return (as many IPOs have hit the upper price limit for 5 or more consecutive days), such a limit can effectively dilute the negative IPO impact on the whole market by spreading speculation on IPO shares over a prolonged period after the listing. This should decrease the selling of existing market shares on PRE_L and LD but increase the selling on the next few days. However, the overall selling should be reduced as the speculative opportunities for high IPO returns are segmented. To examine if this is indeed the case, we repeat the regression for equations (4) and (5) with the subsample period 2014–2016.[22] The results are reported in Panel B of Table 7.

The estimated coefficients for PRE_L, LD, and POST_L in column 1 of Panel B in Table 7 are unanimously insignificant for the market return, indicating that the imposition of the cap for the first-day IPO return eliminates the negative IPO price impact on the market around the listing day. The estimated coefficients for PRE_O, OD, FP, and UFP are also unanimously insignificant in column 1. This is probably due to the fact that many IPOs have the same listing day but different offering days. For example, the 25 IPOs in 2014 fell on only 4 listing days but had 8 offering days, and the 5 IPOs in 2015 fell on 1 listing day but had 2 offering days. So the subscription effect around OD is diluted. In addition, no funds are frozen for IPO subscription staring 2016. Furthermore, the frozen ratio is rather low for our sample in 2014, only 42 times the issuing proceeds (see Table 3). For turnover, the estimate for FP is negative and marginally significant in column 3 of Panel B. Overall, the results in Panel B suggest that the listing-day IPO return ceiling imposed by the CSRC reduces the negative IPO price impact

[22] We do not repeat the regression for order imbalance, as the data end in 2012.

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on the market, indicating that speculation on IPO shares is likely to be the main driver for the negative IPO price impact. However, these results are preliminary and should be interpreted with caution as the sample period is rather short, with only 6 listing events included.

In addition, to check the possible IPO impact on the market after the listing day, we lengthen our LD period to examine whether the IPO has a prolonged negative price impact on the market. It can be argued that the negative IPO impact on the market may spill over to the next few days. As shown in Table A2 in the Internet Appendix, 29 of 32 IPO firms in our subsample hit the 44% return ceiling on the listing day, and 19 continued to hit the daily price limit (10%) for at least 1 day after the listing day. One of them hits the daily price limit consecutively for 17 trading days. We redefine the LD as 3, 5, or even 10 days starting from the listing day and repeat the regression. The results are qualitatively the same as those reported in Panel B of Table 7 (see Table A3 in the Internet Appendix).

We further examine whether the IPO impact varies with the size of the IPO. Specifically, we run the following OLS regressions across the IPOs in our samples:

$$\text{MR}_{it} = \alpha_0 + \alpha_1 \text{SIZE}_i + \text{YEAR} + \varepsilon_t, \tag{5}$$

$$\text{TURNOVER}_{it} = \alpha_0 + \alpha_1 \text{SIZE}_i + \text{YEAR} + \varepsilon_t, \tag{6}$$

$$\text{ORD_IMB}_{it} = \alpha_0 + \alpha_1 \text{SIZE}_i + \text{YEAR} + \varepsilon_t, \tag{7}$$

where MR_{it}, TURNOVER_{it}, and ORD_IMB_{it} are the market return, turnover, and order imbalance, respectively, for the ith IPO in our sample on the relevant day/period, t. For the offering event, we use the frozen ratio as the proxy for the subscription size in the PRE_O, OD, and FP regressions and the unfrozen ratio as the size proxy in the UFP regression. For the listing-event regressions, we use the IPO trading value ratio as the size proxy. These variables were defined earlier, and the summary statistics of these size variables are shown in Table 5. The year dummies are used to control for calendar-year effects. For MR_{it} and ORD_IMB_{it}, we run separate regressions for PRE_O, OD, FP, UFP, PRE_L, LD, and POST_L, while for TURNOVER_{it}, we run separate regressions for FP and UFP. Table 8 presents the regression results. For brevity, we report only the results for the 1-day definitions of the PRE_O, UFP, PRE_L, and POST_L periods. The results are qualitatively the same when the 2-day definition is used.

Panel A of Table 8 presents the results for equation (5). We do not find a statistically significant negative relation between the market return and the frozen or unfrozen ratio on or before the offering day, during the frozen period, or on the unfrozen day. This is understandable as the frozen or unfrozen ratio may not be proportional to the subscription money raised from selling existing shares. However, we find a statistically significant size effect on the prelisting day and the listing day. A 1% increase in the IPO trading value is associated with a 0.03% decrease in the market return on the prelisting day and another 0.03% decrease on the listing day. These decreases are statistically significant at the 1% level. The magnitude of these drops is quite large when compared with the corresponding

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TABLE 8
Regression on IPO Size

Table 8 reports the regression results for market return, turnover, and order imbalance on the IPO size measures. The regression models are as follows:

$$\text{MR}_{it} = \alpha_0 + \alpha_1 \text{SIZE}_i + \text{YEAR} + \varepsilon_t, \quad (5)$$

$$\text{TURNOVER}_{it} = \alpha_0 + \alpha_1 \text{SIZE}_i + \text{YEAR} + \varepsilon_t, \quad (6)$$

$$\text{ORD_IMB}_{it} = \alpha_0 + \alpha_1 \text{SIZE}_i + \text{YEAR} + \varepsilon_t, \quad (7)$$

where MR_{it}, TURNOVER_{it}, and ORD_IMB_{it} are market return, turnover, and order imbalance for the ith IPO event in the sample in period t, respectively. All return, turnover, and order-imbalance measures are percentages. For the listing-event (PRE_L, LD, and POST_L) regressions, SIZE_i is proxied by the IPO trading ratio, defined as the trading value of the IPO shares divided by the market trading value excluding the IPO shares on the listing day. For the offering-event (PRE_O, OD, and FP) regressions, SIZE_i is proxied by the frozen ratio, while, for UFP regressions, size is proxied by the unfrozen ratio. The frozen (unfrozen) ratio is defined as frozen (unfrozen) funds associated with the IPO subscription divided by the average daily trading value from $T-2$ to T. Year dummies are used to control for the calendar-year effect. Panels A, B, and C present the size effect on market return, turnover, and order imbalance, respectively. t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Constant	SIZE	YEAR	No. of Obs.	R^2
Panel A. IPO Size Effect on MR_{it} (1996–2016)					
PRE_O	0.44	0.00	Yes	651	0.06
	(1.32)	(0.72)			
OD	0.14	−0.00	Yes	651	0.02
	(0.43)	(−0.89)			
FP	0.14	−0.00	Yes	651	0.07
	(0.75)	(−1.21)			
UFP	0.37	0.00	Yes	651	0.08
	(1.35)	(1.26)			
PRE_L	0.72*	−0.03***	Yes	597	0.05
	(1.89)	(−3.06)			
LD	0.62	−0.03***	Yes	597	0.09
	(1.54)	(−4.18)			
POST_L	−0.00	−0.01	Yes	597	0.05
	(−0.00)	(−0.81)			
Panel B. IPO Size Effect on TURNOVER_{it} (1996–2016)					
FP	4.01***	−0.02***	Yes	651	0.51
	(14.83)	(−6.88)			
UFP	3.93***	−0.01***	Yes	651	0.49
	(14.23)	(−6.70)			
Panel C. IPO Size Effect on ORD_IMB_{it} (2003–2012)					
PRE_O	0.76	−0.13	Yes	222	0.12
	(0.11)	(−1.43)			
OD	−1.02	−0.07	Yes	224	0.10
	(−0.15)	(−0.94)			
FP	−12.04***	−0.13**	Yes	227	0.18
	(−4.74)	(−2.55)			
UFP	4.45	0.04	Yes	225	0.20
	(0.88)	(0.35)			
PRE_L	7.68	−0.37***	Yes	211	0.10
	(0.90)	(−3.42)			
LD	−0.36	−0.73***	Yes	214	0.18
	(−0.10)	(−4.91)			
POST_L	12.40*	−0.14	Yes	214	0.09
	(1.78)	(−0.65)			

mean returns of −0.07% (−0.10%) on the pre-listing day and −0.12% (−0.16%) on the listing day as shown in Panel A of Table 6 (or the corresponding regression estimates reported in column 1 of Table 7). The size effect is not found in the POST_L regression, indicating the reversal on the post-listing day is not related to the IPO trading ratio on the listing day. The results are qualitatively the same

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when we use the issuing ratio to replace the IPO trading ratio in the regressions (see Table A4 in the Internet Appendix).

The regression results for equation (7) shown in Panel C of Table 8 further confirm these findings in that order imbalance is negatively related to the IPO trading ratio on the pre-listing day and the listing day but not on the post-listing day. A 1% increase in the IPO trading ratio is associated with a 0.37% (statistically significant at the 1% level) and 0.73% (significant at the 1% level) decrease in order imbalance on the pre-listing day and the listing day, respectively (the corresponding mean order imbalances on these days, shown in Panel C of Table 6, are −0.02% and −3.12%, respectively). On the other hand, order imbalance is also negatively related to the frozen ratio during the frozen period. A 100% increase in the frozen ratio is associated with a 0.13% daily drop in order imbalance a day during the frozen period.

Panel B of Table 8 reports the regression results for equation (6). We find that market turnover is negatively related to the frozen ratio during the frozen period. The estimated coefficient is −0.02, which is significant at the 1% level, indicating that a 100% increase in the frozen ratio is associated with a 0.02% reduction in the daily market turnover during the frozen period (the mean average daily turnover in the frozen period is 1.86%, as shown in Panel B of Table 6). However, this statistically significantly negative relation continues on the unfrozen day with a 100% increase in the unfrozen ratio being associated with a 0.01% drop in the daily market turnover, which is unexpected.[23]

Overall, we find that the larger the IPO is, the more negative its impact on the market. However, the size effect is mainly concentrated on the pre-listing day and the listing day. The results are qualitatively the same when we add the lagged term of the dependent variable in equations (5)–(7) (see Table A5 in the Internet Appendix) and when we use the all-share market return in place of the SSE return in equation (5) (see Table A6 in the Internet Appendix).

As mentioned earlier, the IPO sample is selected based on the issuing proceeds being more than 2% of the average daily trading value in the month before the IPO. We repeat the Tables 7 and 8 regressions using alternative IPO samples with cutoff points at 1% and 3%, respectively. The results are largely consistent with those reported in Tables 7 and 8 (see Tables A7 and A8 in the Internet Appendix). More robustness checks for subsamples are reported in Table A9 in the Internet Appendix.

C. Effectiveness of CSRC Moratoriums

The CSRC has imposed 9 moratoriums on IPO issuance so far, with 6 in our sample period. However, the effectiveness of this policy in supporting the market price has not been examined. On the one hand, these moratoriums may boost the market as they freeze the share supply for a long period of time. This may increase the demand for existing shares as some funds reserved for IPO subscriptions flow back into the market. On the other hand, the moratoriums may disrupt issuing firms' financing plans and foster speculation. Furthermore, the moratoriums may

[23] We do not repeat the regression for the period 2014–2016, as there are only 6 listing events during that period.

lead to increased share supplies once the moratorium is lifted, as firms that were forced to postpone their IPOs rush to issue.

Our finding that the negative IPO impact on the market is largely reversed shortly after the offering and the listing seems to suggest that the moratorium is unnecessary at boosting stock prices. However, we cannot conclude this for two reasons. First, our test is based on IPOs issued during relatively booming times (excluding all moratorium periods), but it is possible that the negative impact on the market may be stronger and last longer during periods of lower stock prices when the moratoriums are in place. Second, a large IPO during the bear market period may cause a significant drop in the market price, which may unleash a crash. Since it is impossible to directly compare the IPO impact on the market during periods with moratoriums and periods without, as there are no IPOs during the moratorium periods, we resort to the market response to the IPO moratorium events to gauge the effectiveness of this policy.

An IPO moratorium takes effect once the moratorium is announced. We use Hexun (http://stock.hexun.com/2015-07-05/177286288.html),[24] a Chinese financial news Web site, to identify the beginning days (ANNO1) and ending days (ANNO2) of the 9 CSRC-imposed moratoriums. Assuming that the moratorium is not fully anticipated, we should see a positive market response to the beginning of a moratorium and probably a negative response to the ending of the moratorium if the policy is perceived to be effective.

Table 9 presents market returns around the announcement day (day 0). The table lists the daily market return from 3 days before to 3 days after the ANNO1 and ANNO2 of the 9 moratoriums. The table also presents the average daily

TABLE 9

Market Returns around the Beginning and Ending of IPO Moratoriums

Table 9 presents the daily or daily-average market (SSE Composite Index) returns around the beginning and the ending of nine IPO moratoriums imposed by the CSRC from 1991 to 2016. Day 0 refers to the beginning or the day after the ending of a moratorium. −3 refers to 3 days before the relevant moratorium event day, etc. Avg(−30,−10), the average daily market return from 30 trading days to 10 trading days before the beginning or ending of a moratorium, serves as the benchmark return (all returns are expressed as percentages).

Starting Day (ANNO1)	7/21/1994	1/19/1995	7/5/1995	7/31/2001	8/26/2004	5/25/2005	12/6/2008	11/3/2012	7/4/2015
Avg(−30, −10)	−1.04	−0.03	−0.63	−0.06	−0.11	−0.27	0.21	0.03	−0.01
−3	−3.62	−1.51	−2.07	−0.86	−1.22	−0.38	4.01	0.32	−5.23
−2	0.38	−0.15	−2.76	−1.35	1.45	−2.59	1.84	1.72	−3.48
−1	−1.65	0.97	1.21	−5.27	−0.36	0.28	0.86	0.60	−5.77
0	−3.29	−3.69	2.48	−1.86	−0.40	−0.16	3.57	−0.14	2.41
1	−4.51	−0.08	0.27	3.47	−1.03	−1.24	−2.54	−0.38	−1.29
2	3.21	−3.12	4.55	−1.51	−0.09	−0.65	2.03	−0.01	−5.90
3	3.56	−1.06	−0.08	0.09	1.72	0.78	−2.28	−1.63	5.76
Ending Day (ANNO2)	**12/7/1994**	**6/9/1995**	**1/3/1996**	**11/2/2001**	**1/23/2005**	**6/2/2006**	**6/29/2009**	**12/13/2013**	**11/6/2015**
Avg(−30, −10)	−0.37	1.23	−0.61	−0.73	−0.31	1.07	0.23	0.18	0.49
−3	−0.64	−0.36	−2.38	−1.04	−0.60	0.53	1.02	−0.03	−0.25
−2	−2.18	3.96	−0.27	0.38	−1.13	−0.96	0.09	−1.49	4.31
−1	−1.38	−2.86	−3.14	1.10	2.50	2.61	0.11	−0.06	1.83
0	−0.17	0.96	0.85	−0.96	1.73	−0.88	1.61	−0.31	1.91
1	−1.38	−0.56	3.01	−0.70	−0.12	0.91	−0.54	−1.60	1.58
2	−0.50	0.03	−4.01	−0.49	−0.98	−0.33	1.65	−0.45	−0.18
3	−3.15	−1.39	0.52	−4.62	−1.29	−5.33	1.73	−0.13	0.27

[24]The ending date of the last moratorium in late 2015 is not available on the Web site, but it can be identified from the *China Securities Journal* or http://money.163.com/15/1106/17/B7OO2ML900254IU4.html.

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market returns from 30 days before to 10 days (−30, −10) before each event day, which is presented as a benchmark. Inspection of the table shows that there is no clear pattern that the market return around ANNO1 (ANNO2) is higher (lower) than the benchmark return (except for those with regard to the first moratorium). This is further confirmed in a regression framework in which we include dummies for moratorium announcements in a GARCH setup similar to equation (2) (see Tables A10 and A11 in the Internet Appendix).

Overall, the market responds neither positively to the announcement of the moratorium nor negatively to the announcement of lifting the moratorium. This is inconsistent with the view that IPO moratoriums can mitigate the downward price pressure during bad times. Together with our findings that the IPO effect is largely transitory, this suggests that the imposition of the IPO moratorium is ineffective and, thus, unnecessary.

V. Conclusion

Prior research has shown that IPOs impact the prices of other stocks that are closely correlated with those IPOs. We go one step further to examine whether sizable IPOs affect the market as a whole. Using an IPO sample from China, where, during most of our sample period, prospective IPO investors had to post funds for their orders and almost all IPOs were heavily oversubscribed, we find robust evidence that sizable IPOs depress the market return. On average, market return drops 0.10% on the pre-listing day and another 0.16% on the IPO-listing day. In addition, IPO subscription has a negative impact on market return from the day before the offering until the end of the frozen period, with a cumulative return from −0.53% to −0.67%. This is interesting as it shows that an IPO can still depress market return even if a large amount of money used for subscribing IPO shares comes from sources other than selling existing shares. However, we find that the IPO impact on the market is largely transitory as the market price bounces back 0.15% on the post-listing day and 0.40% on the unfrozen day. This is inconsistent with Braun and Larrain (2009), who find that the negative impact is permanent. However, they examine the IPO impact on industry portfolios, while we look at the impact on the market as a whole.

Our corroborating evidence on order imbalance and turnover further confirm that sizable IPOs have a negative but transitory impact on the market. Order imbalance is significantly negative on the listing day, followed by a reversal the next day. In addition, order imbalance is statistically significantly negative during the frozen period. Market turnover is also statistically significantly negative during the frozen period and followed by a reversal on the unfrozen day. The IPO impact on the market is also related to the IPO size. Specifically, a 1% increase in the listing day IPO trading ratio is associated with a decrease of 0.03% (0.73%) in market return (order imbalance) on the listing day.

The finding that IPOs have only a transitory impact on the market does not lend support to the CSRC's moratorium policy, as placing a moratorium on IPOs is unnecessary if the negative IPO impact on the market is short lived. Our analysis of the market response to moratorium announcements further shows that investors do not perceive them to be good news. However, the imposition of the first-day

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IPO return ceiling by the CSRC in Jan. 2014 seems to dilute IPO speculation to a certain extent, and we do not observe any significantly negative market return around the offering day or the listing day.

More generally, our study has theoretical implications for supply shocks, cross-stock price pressure, and substitution between stocks and bank credits as well as practical implications for investors and regulators.

References

Apolinario, R. M. C.; O. M. Santanta; L. J. Sales; and A. R. Caro. "Day of the Week Effects on European Stock Markets." *International Research Journal of Finance and Economics*, 2 (2006), 53–70.

Asquith, P., and D. Mullins. "Equity Issues and Offering Dilution." *Journal of Financial Economics*, 15 (1986), 61–89.

Barberis, N.; A. Shleifer; and J. Wurgler. "Comovement." *Journal of Financial Economics*, 75 (2005), 283–318.

Bollerslev, T. "Generalized Autoregressive Conditional Heteroskedasticity." *Journal of Econometrics*, 31 (1986), 307–327.

Braun, M., and B. Larrain. "Do IPOs Affect the Prices of Other Stocks? Evidence from Emerging Markets." *Review of Financial Studies*, 22 (2009), 1505–1544.

Cheung, Y.; Z. Ouyang; and W. Tan. "How Regulatory Changes Affect IPO Underpricing in China." *China Economic Review*, 20 (2009), 692–702.

Corwin, S. "The Determinants of Underpricing for Seasoned Equity Offers." *Journal of Finance*, 58 (2003), 2249–2279.

De Long, J. B.; A. Shleifer; L. H. Summers; and R. J. Waldmann. "Noise Trader Risk in Financial Markets." *Journal of Political Economy*, 98 (1990a), 703–738.

De Long, J. B.; A. Shleifer; L. H. Summers; and R. J. Waldmann. "Positive Feedback Investment Strategies and Destabilizing Rational Speculations." *Journal of Finance*, 45 (1990b), 379–395.

Engle, R. F. "GARCH 101: The Use of ARCH/GARCH Models in Applied Econometrics." *Journal of Economic Perspectives*, 15 (2001), 157–168.

French, K. "Stock Returns and the Weekend Effect." *Journal of Financial Economics*, 8 (1980), 55–69.

Grossman, S., and J. Stiglitz. "On the Impossibility of Informationally Efficient Markets." *American Economic Review*, 70 (1980), 393–408.

Harris, L., and E. Gurel. "Price and Volume Effects Associated with Changes in the S&P 500 List: New Evidence for the Existence of Price Pressures." *Journal of Finance*, 41 (1986), 815–829.

Krasker, W. "Stock Price Movements in Response to Stock Issues under Asymmetric Information." *Journal of Finance*, 41 (1986), 93–105.

Lee, C., and M. Ready. "Inferring Trade Direction from Intraday Data." *Journal of Finance*, 46 (1991), 733–747.

Liao, L.; B. Liu; and H. Wang. "Information Discovery in Share Lockups: Evidence from the Split-Share Structure Reform in China." *Financial Management*, 40 (2011), 1001–1027.

Lin, C.; M. Firth; and H. Zou. "Friends or Foe? The Roles of State and Mutual Fund Ownership in the Split Share Structure Reform in China." *Journal of Financial and Quantitative Analysis*, 45 (2010), 685–706.

Marisetty, V. B., and M. G. Subrahmanyam. "Group Affiliation and the Performance of IPOs in the Indian Stock Market." *Journal of Financial Markets*, 13 (2010), 196–223.

Meidan, D. "A Re-Examination of Price Pressure around Seasoned Equity Offerings." Working Paper, Northwestern University (2005).

Shen, Z.; J. Coakley; and N. Instefjord. "Investor Participation and Underpricing in Lottery-Allocated Chinese IPOs." *Pacific-Basin Finance Journal*, 25 (2013), 294–314.

Shleifer, A., and R. W. Vishny. "The Limits of Arbitrage." *Journal of Finance*, 52 (1997), 35–55.

Smirlock, M., and L. Starks. "Day-of-the-Week and Intraday Effects in Stock Returns." *Journal of Financial Economics*, 17 (1986), 197–210.

Sun, Q.; W. Tong; and Y. J. Wu. "Overseas Listing as a Policy Tool: Evidence from China's H-Shares." *Journal of Banking & Finance*, 37 (2013), 1460–1474.

Wurgler, J., and E. Zhuravskaya. "Does Arbitrage Flatten Demand Curves for Stocks?" *Journal of Business*, 75 (2002), 583–608.

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