Going public to acquire? The acquisition motive in IPOs ☆

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ABSTRACT

Newly public firms make acquisitions at a torrid pace. Their large acquisition appetites reflect the concentration of initial public offerings (IPOs) in mergers and acquisitions- (M&A-) intensive industries, but acquisitions by IPO firms also outpace those by mature firms in the same industry. IPO firms' acquisition activity is fueled by the initial capital infusion at the IPO and through the creation of an acquisition currency used to raise capital for both cash- and stock-financed acquisitions along with debt issuance subsequent to the IPO. IPO firms play a bigger role in the M&A process by participating as acquirers than they do as takeover targets, and acquisitions are as important to their growth as research and development (R&D) and capital expenditures (CAPEX). The pattern of acquisitions following an IPO shapes the evolution of ownership structure of newly public firms.

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1. Introduction

Why do firms choose to go public? An initial public offering (IPO) is one of the most consequential events in the life of a company, but understanding of this decision remains incomplete. Existing theories offer several insights for the decision to go public. In theory, an IPO creates liquidity for the firm's shares, provides an infusion of capital to fund growth, allows insiders to cash out, provides cheaper and ongoing access to capital, facilitates the sale of the company, gives founders the ability to diversify their risk, allows venture capitalists (VCs) and other early-stage investors to exit their investment, and increases the transparency of the firm by subjecting it to capital market discipline.

Despite the abundance of theoretical arguments, empirical evidence on why firms go public and the investment and financing activities of IPO firms is limited. Pagano, Panetta, and Zingales (1998) show that Italian firms went public not to finance future investments and growth, but rather to rebalance their capital structure and to exploit sectoral misvaluation. Lowry (2003) studies aggregate IPO data and finds that firms' demands for capital and investor sentiment are the most significant determinants of IPO volume. Boehmer and Ljungqvist (2004) show that German firms go public when their investment opportunities and valuations become attractive. Rosen, Smart, and Zutter (2005) find banks that go public are more likely to become targets as well as acquirers than those that stay private. Kim and Weisbach (2008) show financing of capital expenditures and the desire to benefit from potential overvaluation are motives for seasoned equity offerings (SEOs) and IPOs.

We study a relatively unexplored motive for IPOs—the desire to make acquisitions. Surveys of corporate executives suggest that acquisitions are a very important

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motive for an IPO. A survey of chief financial officers by Brau and Fawcett (2006) finds the desire to create an acquisition currency ranks as the most important reason for an IPO. In fact, survey participants rank the importance of an acquisition currency ahead of most other commonly considered motives, such as cost of capital considerations and need for VCs and founders to exit or diversify their holdings. While informative, the Brau and Fawcett (2006) survey is limited to the three-year period of 2000–2002, the same time frame when many Internet firms also went public. The preponderance of such high-growth company IPOs, combined with intense mergers and acquisitions (M&A) activity in the overall economy during this period raises the question of whether their results can be generalized for other periods. For example, the over-valuation during the Internet boom could have increased managers' appetites to acquire, thereby fueling many IPOs during this period. In fact, Schultz and Zaman (2001) show that many Internet firms that went public during this period engaged in a significant amount of post-IPO acquisition activity.[2]

We analyze the post-IPO acquisition activity of IPO firms over a 20-year period from 1985 to 2004, and we demonstrate a high incidence of newly public firms participating in mergers and acquisitions. IPO firms start engaging in M&A as early as the IPO year, and 31% of IPO firms conduct at least one acquisition within their IPO year. Within the first five years of the IPO, 77% of firms conduct at least one acquisition, and the typical IPO firm makes four acquisitions in this five-year period. On average, IPO firms conduct acquisitions worth 41% of their market value at the time of the IPO during their first five years. It is striking that, for the typical IPO firm, the average expenditure on acquisitions is substantially greater than either capital expenditures (CAPEX) or research and development (R&D). The average acquisition volume is similar to the combined outlays on R&D and CAPEX, indicating that acquisitions play an important role in the growth of newly public companies.

The appetite for making acquisitions increases after an IPO. Only 19% of IPO firms make an acquisition as a private firm in the five years before they go public. After an IPO, 74% complete an acquisition in their first five years as a public company. The typical IPO firm completes only 0.43 acquisitions in the five years prior to the IPO, compared with four acquisitions in the five years after going public, highlighting the importance of acquisitions for newly public companies.

We conduct a number of tests to provide insight on the determinants of post-IPO M&A activity. Our first observation is that the M&A activity of IPO firms is strongly linked to the amount of M&A activity within their industry. In other words, IPOs tend to occur in industries with high M&A activity. Yet, industry clustering of IPOs and M&A does not fully explain the acquisition appetite of IPO firms. By most benchmarks, IPO firms are more prolific acquirers than the mature public firms within their industry.

We consider three potential avenues by which an IPO can facilitate future M&A activity and explore whether these explain the acquisition volumes by IPO firms. An IPO can allow companies to pursue M&A by providing an infusion of cash, by opening the possibility of paying for an acquisition with overvalued stock, and by resolving the uncertainty about the pre-IPO valuation of the firm and the gains from a potential takeover. We evaluate these motives by studying the volumes of cash and stock-financed M&A post-IPO.

Our results provide some support for each of these motives. We find the volume of cash-financed M&A in every annual interval up to five years following the IPO is correlated with the proceeds from the IPO. Cash-financed M&A is also positively correlated with the amount of capital raised through SEOs, suggesting that IPOs facilitate acquisitions both because of the initial capital raised and by creating access to public equity markets for subse-quent capital raising. IPO proceeds are correlated with R&D and CAPEX only in the years immediately after the IPO, suggesting that the desire to raise acquisition capital is a longer-term motivation for going public than raising capital for organic growth.

Firms with greater IPO underpricing conduct more stock-financed acquisitions in the years following the IPO. However, IPO underpricing is unrelated to R&D and CAPEX. Because IPO underpricing is closely linked to equity overvaluation for IPO firms, this suggests that IPO firms with overvalued equity find it easier to grow by acquiring other firms than by investing in internal projects. We also find evidence that the reduction in the level of ex ante uncertainty about the valuation of the IPO firm is positively related to the total amount of cash- and stock-financed acquisitions conducted post-IPO. This is consistent with the IPO lowering uncertainty about firm value and increasing the firm's ability to make profitable acquisitions. Cash-financed acquisition volumes by IPO firms are also strongly linked to the amount of debt raised in the post-IPO periods, suggesting that improved access to debt markets represents a channel through which going public facilitates acquisition activity. A similar pattern is not observed for R&D and CAPEX outlays.

Overall, our results show that IPOs significantly change the ability of firms to conduct acquisitions and suggest that this ability to pursue acquisitions might be an important motive for the IPO. Yet we acknowledge that it is difficult to disentangle whether firms went public to pursue acquisitions or whether the IPO presented these firms with windows of opportunities to conduct M&A using overvalued stock. In addition, going public might have improved these firms' ability to pursue acquisitions by providing access to a broader source of funding options, even if the acquisitions themselves were not the primary motive for the IPO. Irrespective of the interpretation, we show that acquisition activity by IPO firms is very meaningful in the context of their R&D and CAPEX outlays. This finding complements the Kim and

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[2] In other work, Brown, Dittmar, and Servaes (2005) study post-IPO performance of 47 roll-up IPOs that involve the creation of a publicly listed entity by the consolidation of several small businesses at the time of the IPO. While roll-up IPOs also engage in acquisitions soon after their listing, both these IPOs and their M&A activity are fundamentally different than the broader set of IPO firms and their M&A activity, which we consider in this paper.

Weisbach (2008) results that equity capital raised from IPOs and SEOs is an important determinant of R&D and CAPEX in the post-IPO period. Together, these studies illuminate the mechanisms by which going public allows companies to exploit their growth options to become mature public companies.

Ours is not the only large-sample study to explore the link between IPOs and M&A. In contemporaneous work, Rau and Stouraitis (2009) study the timing of various corporate event waves and establish that IPO waves are followed by M&A waves, a result consistent with our findings. To understand whether this pattern results from the participation of IPO firms in the M&A process or whether it reflects an industry phenomenon, Rau and Stouraitis (2009) consider how often IPO firms become takeover targets. They find that only 3% of the cash-financed M&A activity and 2% of stock-financed M&A activity can be explained by the acquisition of newly public companies. A fundamental difference between our paper and theirs is that we focus on the role of IPO firms as bidders in the M&A process while they focus on the role of IPO firms as takeover targets. Our results show that IPO firms are very active acquirers in both number and volume of completed acquisitions. IPO firms participate much more actively in the M&A process by being bidders instead of targets, offering an explanation for the post-IPO M&A wave pattern shown by Rau and Stouraitis (2009).

The M&A activity by IPO firms is potentially relevant for understanding other puzzles surrounding IPOs. In particular, the long-run stock return underperformance of IPOs has received considerable attention. Brau, Couch, and Kohers (2010) find that this IPO underperformance is closely related to the acquisition activity of IPO firms. They show that IPO firms that make acquisitions within the first year after going public experience negative excess returns over one- to three-year intervals after the IPO, whereas IPO firms without acquisition activity do not display negative long-run abnormal returns.

Our findings on the importance of M&A for IPO firms have broader implications for the evolution of ownership structure of firms. Helwege, Pirinsky, and Stulz (2007) show that US firms become widely held after they go public and argue that this occurs primarily because of insider selling of shares after the IPO. We show that the acquisition appetite of IPO firms is a critical determinant of their ownership dynamics as well. Both cash- and stock-financed acquisitions can increase the dilution in insider ownership by increasing the number of shares outstanding. Consistent with this view, we find that both cash- and stock-financed acquisitions are positively related to the dilution in insider ownership. Thus, acquisitions play an important role in explaining why US firms become widely held after they go public.

The organization of the paper is as follows. In Section 2, we review existing theories on the motivations for firms to go public and explain our empirical design. In Section 3, we introduce our sample and present the univariate results on the acquisition activity of the IPO firms. Section 4 reports the multivariate results. Section 5 analyzes the relation between post-IPO acquisitions and post-IPO ownership dilution. Section 6 concludes.

2. Motivations for IPOs and empirical design

The theoretical literature offers several reasons that companies choose to go public. Subrahmanyam and Titman (1999) propose that information production by outside investors improves investment decisions and drives the decision to go public. Chemmanur and Fulghieri (1999) also argue that information production costs explain IPO decisions. In their model, an IPO provides cheaper capital by creating a liquid security in the company, whose value reflects all available information, thereby reducing the need for all investors to engage in costly and duplicative information production. Mello and Parsons (1998) postulate that liquidity considerations are important in driving the IPO decision and note that the increased liquidity of the stock lowers the cost of capital. Enhancing the liquidity of the stock can facilitate acquisitions by making it less costly to raise acquisition financing through SEOs and make the equity more appealing as an acquisition currency in stock-financed acquisitions.

Other papers emphasize the benefits an IPO provides by creating an observable market price for the stock. Zingales (1995) argues that, by establishing a market price for the shares, an IPO allows the owners to increase the value they can extract from selling their company. Hsieh, Lyandres, and Zhdanov (2009) suggest that going public reduces the uncertainty about a firm's value, thereby improving its ability to conduct profitable acquisitions.

We consider three reasons that the IPO decision could be linked to M&A considerations. First, the most obvious channel through which an IPO allows companies to pursue acquisitions is by providing an infusion of capital. Under the capital infusion motive, an IPO establishes a war chest that can be used to fund cash-financed acquisitions. Second, as an alternative to cash, an IPO creates publicly traded stock that serves as an acquisition currency that can be used to pay for future M&A. A third potential motive arises from management's ability to observe the firm's valuation as a public company. Hsieh, Lyandres, and Zhdanov (2009) develop a real options model in which, as a private firm, managers of the acquiring firm face uncertainty about true firm value. In their framework, takeover synergies are a linear function of the bidder's true firm value. Thus, uncertainty in firm value creates uncertainty in synergies, which lowers the expected synergy gain from the merger. Because private firms face substantial uncertainty over true firm value, the expected value of synergies is low and they are less likely to engage in a merger, all else equal.

If a private firm goes public, uncertainty about its true value as well as that of synergies is lowered. This increases the expected value of synergies and increases the likelihood that the merger option is in the money. In other words, a lower level of synergies is required to engage in a profitable merger when uncertainty over true firm value is resolved through the IPO process. Thus, firms are more likely to make an acquisition following an IPO because of the reduction in uncertainty over true firm value. This benefit of the IPO process is larger for private firms that face the greatest reduction in uncertainty over firm value at the IPO. These arguments suggest that the

likelihood of a post-IPO merger increases with the amount of valuation uncertainty resolved at the IPO.

We develop predictions of these motives to understand the cross-sectional variation in M&A activity by IPO firms. Under the capital infusion motive, the amount of primary proceeds raised in the IPO should be positively linked to the amount of cash-financed M&A activity. There is no reason to expect that capital infusion in an IPO is relevant only for M&A funding needs. Therefore, we also explore whether R&D and CAPEX are similarly linked to the IPO proceeds. More broadly, if the desire to establish a funding source for M&A drives the IPO decision, we also expect that subsequent financing events such as SEOs and debt offerings would be linked to future M&A activity.

The capital infusion motive does not offer any insights regarding stock-financed M&A activity. Under the acquisition currency motive, IPOs allow firms to pursue M&A by using stock as a method of payment. In the absence of market imperfections and with equally informed bidders and targets, the ability to issue stock that is publicly traded should not be a relevant consideration in an acquisition. However, with information asymmetry among managers, public markets, and potential targets, the ability to issue overvalued stock to pay for an acquisition could provide a motive to conduct an IPO. Shleifer and Vishny (2003) argue that overvalued equity drives many firms to conduct acquisitions, providing a motivation for why managers could desire stock as an acquisition currency. Hence, if the acquisition currency motive is important, we expect to see a higher amount of stock-financed acquisitions for IPO firms with overvalued stock. We use IPO underpricing as a measure of over-valuation around the IPO as suggested by Purnanandam and Swaminathan (2004), who show that the most overvalued IPO firms have the greatest IPO underpricing.

In the context of the acquisition currency motive, we consider a special group of IPOs—carve-out IPOs. In a carve-out IPO, a public parent issues shares in a subsidiary firm. The acquisition motive could be weaker for carve-out IPOs than for new company IPOs because the parent company of the carved-out subsidiary already has an acquisition currency. However, the stock of a diversified parent with multiple business divisions could offer fewer opportunities to exploit sectoral misvaluation. Thus, acquisition currency motives could remain a relevant consideration for carve-out IPOs even though the parent possesses the ability to issue publicly traded stock before the IPO.

The valuation uncertainty resolution motive suggests that firms with a greater reduction in their valuation uncertainty at the IPO should undertake more cash- and stock-financed acquisitions after going public. We use the level of offer price revisions at the IPO as a proxy for the amount of uncertainty resolution during the IPO because offer price revisions reduce uncertainty about firm value by incorporating information collected during the book building and registration period. A key insight of the valuation uncertainty motive is that the benefit of an IPO occurs equally for both cash- and stock-financed acquisitions because the IPO itself, irrespective of the form of merger consideration, informs bidder management about

true firm value and the synergies from a potential takeover.

Hsieh, Lyandres, and Zhdanov (2009) argue that going public is costly due to underwriting fees and the dilution of the original owner's equity ownership. An IPO benefits the firm by improving its ability to assess synergies from an acquisition more precisely and increasing the expected gains from an acquisition. Trading-off these costs against the benefits generates the prediction that firms with a higher cost of going public engage in more acquisitions early on to maximize the benefits of an IPO.

A related argument is that, by reducing information asymmetry, an IPO could increase a firm's ability to borrow. This idea is related to Rajan (1992), who suggests that a reduction in asymmetric information can weaken the hold-up problem between the firm and its lenders. In other words, going public could weaken the monopoly power of relationship banks over the IPO firm and improve the firm's ability to pursue debt-financed acquisitions. Consistent with this view, Schenone (2009) finds that firms experience a drop in interest rates after their IPO. Thus, the idea of uncertainty resolution also offers the prediction that the amount of debt capital raised subsequent to the IPO should be positively correlated with the amount of cash-financed acquisitions.

3. Univariate analysis of post-IPO acquisition activity

We examine the number and volume of completed acquisitions by IPO firms. As a basis of comparison, we benchmark this against the amount of CAPEX and R&D by IPO firms, by the number and volume of M&A transactions by IPO firms when they were private, and by the acquisition activity of mature companies.

3.1. Data

Our IPO data come from Securities Data Company (SDC) and covers all US IPOs over the 20-year period from January 1985 to December 2004, with total proceeds equal to or greater than $100 million in 2004 dollars ($57 million in 1985 dollars).[3] We impose this size cutoff to ensure we have IPOs of a certain minimum size with reliable data on M&A activity.[4] This probably biases us against finding a significant role for acquisitions, as Brau and Fawcett (2006) report that the desire to create an acquisition currency in IPOs is greater for smaller firms. Nonetheless, it is important to note that the amount of IPO proceeds raised by our sample accounts for 76% of all IPO proceeds reported in SDC over this period. We also restrict our sample to those firms for which Compustat

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[3] Throughout, we adjust dollar values for inflation and report them in 1985 dollars for comparability.

[4] Inspection of SDC's M&A data supports this concern. For IPOs where proceeds are below $100 million (in 2004 dollars), deal values for subsequent M&A transactions are missing for almost 50% of all recorded acquisitions. This compares with 40% of missing deal values for transactions involving bidders with IPO proceeds greater than this cutoff. In addition, our spot-checking suggests that some small deals could go unrecorded in SDC.

Table 1
Descriptive statistics for initial public offering (IPO) firms that went public between 1985 and 2004.

  The sample includes all IPO firms with IPO proceeds greater than $100 million in 2004 dollars (or greater than $57 million in 1985 dollars), for which Compustat data are available. Underpricing is the difference between the first day closing price and the offer price, as a percentage of the offer price.

IPO year	Number of IPOs	Average IPO proceeds (millions & nominal dollars)	Average IPO proceeds (millions & dollars in 1985)	Average percentage underpricing	Average percentage of Secondary shares	Percentage of IPOs issuing any secondary shares	Percentage of carve-outs
1985	25	163.58	163.58	3.59	20.15	36.00	28.00
1986	50	173.96	172.07	4.73	22.51	38.00	14.00
1987	36	171.30	162.25	6.96	21.63	36.11	19.44
1988	21	121.84	110.51	2.37	6.39	23.81	19.05
1989	19	173.84	150.68	− 0.29	39.66	57.89	15.79
1990	12	160.46	131.08	11.27	43.00	50.00	33.33
1991	42	178.84	141.75	12.75	20.15	50.00	9.52
1992	65	190.55	146.77	7.53	25.61	49.23	13.85
1993	119	204.84	153.56	5.45	19.78	35.29	13.45
1994	70	195.48	142.72	3.58	16.34	27.14	7.14
1995	56	215.00	153.09	19.85	21.85	44.64	5.36
1996	108	211.85	146.00	17.40	17.93	41.67	11.11
1997	103	226.30	153.34	11.72	18.46	35.92	5.83
1998	64	375.14	250.17	20.69	17.39	35.94	12.50
1999	140	301.67	195.92	86.06	9.28	23.57	12.14
2000	127	328.91	206.61	75.89	2.77	8.66	10.24
2001	39	648.39	401.07	11.35	10.50	20.51	20.51
2002	41	417.36	252.17	7.70	21.24	43.90	19.51
2003	45	251.95	149.42	12.32	24.67	53.33	4.44
2004	113	345.80	198.61	13.20	18.47	37.17	6.19
1985–2004	1,295	265.45	180.70	25.29	17.08	34.21	11.58

data are available for the IPO year. Firms are retained in the sample until the first year in which they exit Compustat. Data on subsequent capital raising and acquisition transactions come from the SDC new issues and mergers and acquisitions databases. In tabulating acquisitions we do not include buybacks, recapitalizations, or exchange offers.

Table 1 reports descriptive statistics for the sample. We have 1,295 IPOs that meet the sample selection criteria. The number of IPOs in our sample varies over time, with a sharp rise in 1999 and 2000 coincident with the Internet boom. The average amount of the total proceeds (primary and secondary capital) raised in the IPO is $181 million in 1985 dollars. On average, 17% of the total proceeds in IPOs come from the sale of existing secondary shares, and 34% of the sample firms have sold secondary shares. We calculate the level of underpricing for each IPO by dividing the difference between the first day closing price and the offer price by the offer price. In our sample, the average level of underpricing is 25%, but this average is influenced heavily by the 1999–2000 period, where underpricing averaged 81%. Excluding these two years, the average underpricing in the sample drops to 11%. Our sample contains both initial listings of companies and equity carve-outs, which make up 12% of the sample.

3.2. Post-IPO M&A activity

We track all M&A activity for our sample firms for up to five years, including the IPO year. We include mergers and acquisitions of public and private companies as well as acquisitions of assets. Table 2 summarizes the acquisition activity undertaken by the IPO firms. Year 0 denotes the year of the IPO, and we report the cumulative volume of M&A activity for windows extending out to five years after the IPO date.[5] As a result of acquisitions and delistings of IPO firms, our sample size drops to 902 by the end of year five.

It is important to note that SDC does not report transaction values for almost 40% of M&A deals in our sample, especially for those transactions in which the target firm is a private firm or a subsidiary of a public firm. We consider these transaction values to be zero. This causes us to underestimate, potentially very substantially, the actual acquisition volumes for IPO firms.

Panel A of Table 2 presents that 31% of the IPO firms make at least one acquisition in their IPO year. This frequency rises each year, so over the five years after the IPO, 77% of firms make at least one acquisition. The average number of acquisitions by an IPO firm in the IPO year is 0.65 and increases to 4.15 by the end of the fifth year. There is dispersion in the number of acquisitions across firms, with IPO firms completing a median of two transactions over the first five years. In aggregate, 3,747 acquisitions are completed in the 4,510 firm-years, indicating that newly public firms tend to be active acquirers. Zingales (1995) argues that an IPO allows firms to be acquired at a higher price by establishing a public market valuation. Our results indicate, however, that IPO

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[5] Our M&A data extend through September 2008. Hence, for firms that went public in the last quarter of 2004, we have slightly less than the full five years of their post-IPO M&A activity.

Table 2
Post-initial public offering (IPO) acquisition activity, research and development (R&D), and capital expenditures (CAPEX).

Panel A presents summary statistics about the post-IPO acquisition activity of our sample of IPO firms. Missing acquisition deal values, whose percentages are reported here, are replaced by zero. Panel B reports mean and median (given in parentheses) acquisition amounts and R&D and CAPEX of these IPO firms as a percentage of the market value of the firm as of the IPO date over the period from year 0 (the IPO year) to year t with $t=0,1,2,3,4$ denoting the number of years after the IPO. The p-values for the paired t-test and the Wilcoxon signed-rank test between the acquisition amount and the R&D and CAPEX are also provided.

	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4
Panel A: acquisition activity of IPO firms over time					
Total number of IPO firms	1,295	1,276	1,219	1,093	902
Number of IPO firms making at least one acquisition	395	698	793	782	695
Percentage of IPO firms making at least one acquisition	30.5	54.7	65.1	71.5	77.1
Total number of acquisitions by IPO firms	846	2,185	3,118	3,662	3,747
Mean number of acquisitions per IPO firm	0.65	1.71	2.56	3.35	4.15
Median number of acquisitions per IPO firm	0	1	1	2	2
Percentage of acquisitions with missing deal value	38.7	38.3	39.8	39.6	38.4
Number of IPO firms being acquired	0	16	27	49	57
Percentage of IPO firms being acquired	0	1.2	2.1	3.8	4.4
Panel B: acquisition amounts and R&D and CAPEX as a percentage of market value of assets					
Acquisitions	7.27	14.29	20.72	29.62	40.46
	(0.00)	(0.00)	(0.79)	(2.47)	(5.16)
CAPEX	3.88	8.02	12.16	16.84	21.33
	(1.47)	(3.22)	(4.88)	(6.81)	(9.40)
p-value for paired t-test (acquisitions versus CAPEX)	0.4298	0.1549	0.0682	0.0179	0.0064
p-value for signed rank test (acquisitions versus CAPEX)	0.0001	0.0001	0.0036	0.1431	0.7752
R&D	0.87	1.73	2.75	3.93	5.17
	(0)	(0)	(0)	(0)	(0)
p-value for paired t-test (acquisitions versus R&D)	0.1333	0.0039	0.0001	0.0001	0.0001
p-value for signed rank test (acquisitions versus R&D)	0.0005	0.0001	0.0001	0.0001	0.0001
CAPEX plus R&D	4.73	9.74	14.91	20.76	26.53
	(2.18)	(4.90)	(7.76)	(11.31)	(15.43)
p-value for paired t-test (acquisitions versus CAPEX+R&D)	0.5463	0.2991	0.2117	0.0962	0.0434
p-value for signed rank test (acquisitions versus CAPEX+R&D)	0.0001	0.0001	0.0001	0.0001	0.0005

firms play a much bigger role in M&A activity by their participation as bidders than they do as targets. Panel A of Table 2 reports that only 4% of IPO firms get acquired in the first five years after going public, suggesting the desire to make acquisitions is likely to be a more important driver of the going public decision than the desire to get acquired based on the market price established through the IPO process.

Panel B of Table 2 presents the acquisition activity of IPO firms in the context of their organic growth initiatives by comparing acquisition volumes to R&D and CAPEX outlays. As a percentage of market value at the time of the IPO, acquisition volumes average 7.3% in the IPO year compared with 4.7% for R&D and CAPEX outlays combined. A paired t-test indicates that these two amounts do not differ significantly from each other, a pattern that holds for the first two years following the IPO. Over longer horizons, average acquisition volumes appear to outpace combined R&D and CAPEX expenses. During years 0–4, acquisition volume averages 40.5% of market value, while R&D and CAPEX average 26.5% with the t-test indicating significance at the 5% level. This difference appears to be driven by a subset of IPO firms that are prolific acquirers, because median acquisition volumes are typically lower than median R&D and CAPEX outlays. It should be noted, however, assuming the M&A transaction value is zero when it is unreported in SDC underestimates the true

median acquisition volume; this concern does not arise for CAPEX and R&D. Overall, Table 2 presents that IPO firms engage in significant M&A activity starting as early as their IPO year, and external growth through acquisitions is of comparable importance to organic growth through R&D and CAPEX.

Perhaps IPO firms are naturally acquisitive and their focus on M&A actions in the post-IPO period is unrelated to the IPO. The data do not favor this interpretation. Panel A of Table 3 presents that only 19% of the firms make an acquisition as a private firm in five years before they go public, whereas this percentage rises sharply to 74% in the five years after the IPO. The number of acquisitions made also shows a striking increase after the IPO. IPO firms make 0.43 acquisitions, on average, in their last five years as a private firm, but they make 3.64 acquisitions, on average, in the first five years after the IPO. The median number of acquisitions over the five-year period rises from zero to two after the IPO. Panel B of Table 3 reports the mean and the median acquisition volume over the pre- and post-IPO five-year periods. This comparison also shows a sharp rise in acquisition activity. The pre-IPO acquisition volume averages 26% of market value as of the IPO date, whereas the post-IPO acquisition volume averages 46%.

The comparison between pre- and post-IPO M&A volumes should be interpreted with caution because of

Table 3
Comparison of pre- and post-initial public offering (IPO) acquisition activity.

Comparison of the acquisition activity of the IPO firms within five years before and within five years after going public, for all targets (public and private) and for public targets only. Panel A presents summary statistics about the pre- and post-IPO acquisition activity of the sample firms. Missing acquisition deal values, whose percentages are reported here, are replaced by zero. Panel B reports mean and median (in parentheses) total acquisition volumes over the two five-year periods as a percentage of the market value as of the IPO date. Panel B also reports the z-statistic of Wilcoxon-Mann-Whitney test for comparison of the pre-and post-IPO period. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	All targets		Public targets	
	Five-year period before IPO	Five-year period after IPO	Five-year period before IPO	Five-year period after IPO
Panel A: summary statistics				
Total number of firms	1,295	1,295	1,295	1,295
Number of firms making at least one acquisition	250	954	181	719
Percentage of firms making at least one acquisition	19.31	73.67	13.98	55.52
Total number of acquisitions	561	4714	327	2079
Mean number of acquisitions per firm	0.43	3.64	0.25	1.61
Median number of acquisitions per firm	0	2	0	1
Percentage of acquisitions with missing deal value	51.52	38.91	39.76	28.57
Panel B: acquisition amounts as percentage of market value of assets				
Total acquisition amount	25.69	45.61	24.52	33.02
	(1.11)	(11.40)	(0)	(3.05)
z-statistic		9.89***		5.79***

the possibility that acquisition activity is under-reported for private firms in SDC. The SDC database compiles its list of M&A transactions based on Securities and Exchange Commission (SEC) filings and company press releases. This creates the likelihood that some acquisitions by private acquirers are not recorded if SEC filings or press releases are missing. However, acquisitions in which the target is a public company should be immune to this potential recording bias because SEC filings are mandatory in these cases. Thus, we compare the acquisition activity involving only publicly listed targets as well. Table 3 presents a sharp difference in the acquisition of public companies pre- and post-IPO. In the five years before an IPO, 14% of sample firms acquired a public target, but 56% of firms acquired a public target in the five years following an IPO. The total number of acquisitions of public companies rises more than six-fold in the post-IPO period from 327 to 2,079 and the average volume of public company acquisitions as a percentage of the market value of the firm at the time of the IPO jumps from 25% in the pre-IPO period to 33% post-IPO.

3.3. Univariate tests

We start by providing some univariate comparisons illustrating the importance of industry, capital infusion, and valuation effects on the acquisition activity of IPO firms. The acquisition activity of IPO firms and that of mature firms could be fundamentally related to each other if both are driven by acquisition opportunities available in their industry. Thus, we explore if the acquisition activity of IPO firms is concentrated in industries undergoing intensive M&A activity.

To study the link between the M&A of IPO firms and industry-level M&A activity, we calculate a measure of

industry M&A activity for the 48 Fama and French industry groupings. For each industry and each year, we calculate the total volume of acquisitions normalized by the aggregate market capitalization of the industry components. For each year from 1985 to 2004, we classify an industry to be a high (low) acquisition intensive industry if this metric is above (below) its median value among the 48 Fama and French industries in that year. Because we compare acquisition activity over five time horizons in Table 4, we recompute this measure over each horizon so that the time frame for evaluating industry M&A intensity corresponds with the time frame for which we display the M&A activity of IPO firms. An IPO firm is assigned to a high (low) acquisition-intensive industry if its industry is a high (low) acquisition-intensive industry in the IPO year.

Panel A of Table 4 presents that, in the IPO year, IPO firms make acquisitions worth about 11% of their market values when they reside in an M&A active industry, but only worth 2% when they reside in an inactive industry. The difference persists in each of the following time periods. Though it narrows considerably over the years 0–4 (48% versus 30%), the M&A activity of IPO firms in active industries remains higher than in inactive industries. These results suggest that a substantial portion of the M&A activity of IPO firms is due to industry-level M&A activity, perhaps because firms go public to exploit industry-level M&A opportunities.

For comparison, we calculate the amount of R&D and CAPEX undertaken by IPO firms. The data suggest that companies substitute between these outlays and M&A activities to some degree. IPO firms in M&A-active industries expend fewer resources on organic growth through R&D and CAPEX than do firms in less M&A-active industries. In less active M&A industries, IPO firms report spending equivalent amounts on expenditures for organic and M&A growth, averaging about 30% of firm value over

Table 4

Comparison of post-initial public offering (IPO) acquisition activity and research and development (R&D) and capital expenditures (CAPEX) between IPO subsamples based on industry acquisition intensity, normalized primary IPO proceeds, and IPO underpricing.

High (low) acquisition-intensive industries are those industries that have a total acquisition volume (normalized by industry size) above (below) the median volume of the 48 Fama and French industries. The total post-IPO acquisition amounts and R&D and CAPEX by each IPO firm are calculated over time and then normalized by the market value of the firm at the time of the IPO. The subsample comparison for industry acquisition intensity is based on the sum of cash-and stock-financed acquisitions, the comparison for primary IPO proceeds is based on cash-financed acquisitions, and the comparison for IPO underpricing is based on stock-financed acquisitions. The rows ACQ and R&D+CAPEX in Panels A and B report the means of the calculated percentages for acquisitions and R&D and CAPEX, respectively. Panel C reports the z-statistics of Wilcoxon-Mann-Whitney test for comparison of the above-median group and the below-median group, for both the acquisition amounts and R&D and CAPEX over the period from year 0 (the IPO year) to year t with $t=0,1,2,3,4$ denoting the number of years after the IPO. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: above-median subsamples

	High acquisition-intensive industries					Normalized primary IPO proceeds ≥ median of normalized primary IPO proceeds					IPO underpricing ≥ median IPO underpricing				
	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4
Number of firms	786	782	720	640	517	648	638	610	547	451	646	636	608	546	450
ACQ	10.68	20.18	28.16	40.78	48.17	11.16	17.76	24.81	34.36	47.50	1.40	4.86	8.10	10.35	13.91
R&D+CAPEX	4.00	9.13	13.57	18.05	24.04	6.05	11.64	16.98	22.63	28.77	4.60	9.92	14.84	20.52	24.85

Panel B: below-median subsamples

	Low acquisition-intensive industries					Normalized primary IPO proceeds < median of normalized primary IPO proceeds					IPO underpricing < median IPO underpricing				
	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4
Number of firms	505	490	495	451	383	647	638	609	546	451	649	640	611	547	452
ACQ	2.03	4.99	10.06	13.90	30.28	1.47	4.15	6.34	7.53	10.74	0.51	1.81	2.19	6.98	8.78
R&D+CAPEX	5.93	10.81	17.03	24.84	30.16	3.44	7.79	12.77	18.84	24.19	4.88	9.56	14.97	21.00	28.23

Panel C: comparison of the above-median subsamples and the below-median subsamples

	Firms in high acquisition-intensive industries versus firms in low acquisition-intensive industries					Firms with high normalized primary IPO proceeds versus firms with low normalized primary IPO proceeds					Firms with high IPO underpricing versus firms with low IPO underpricing				
	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4
z-statistic for ACQ	2.63***	6.33***	5.41***	5.82***	6.12***	1.45	2.63***	3.02***	3.96***	3.34***	4.09***	6.82***	7.40***	6.67***	6.19***
z-statistic for R&D+CAPEX	−5.27***	−4.78***	−4.77***	−5.18***	−4.83***	1.37	0.44	−0.08	−0.95	−0.55	1.07	2.90***	2.49***	2.14**	0.83

the five years following the IPO.[6] Therefore, the difference between M&A and R&D and CAPEX is driven by IPOs in M&A-active industries for which the total outlays on M&A over the five-year period are more than twice those on R&D and CAPEX.

To evaluate the importance of cash infusion from the IPO, we examine how the amount of new capital raised during the IPO explains the volume of subsequent cash-financed acquisition activity. A typical IPO involves offering two types of shares: primary shares and secondary shares. Primary shares are sold to raise new capital for the firm while secondary shares are sold by existing owners to monetize their holdings. Under the capital infusion motive, the amount of cash-financed acquisitions after the IPO should be positively related to the proceeds from the sale of primary shares. Cash infusions can be used for funding either organic or external growth. Hence, if cash infusion is an important motive in IPOs, we also expect a positive correlation between primary IPO proceeds and R&D and CAPEX.

The middle columns of Table 4 present the average volume of cash-financed acquisitions and of R&D and CAPEX, normalized by firm market value at the time of the IPO, broken down by whether the firms raise more or less primary IPO capital (normalized by firm market value at the time of the IPO) than the median firm. Firms with higher normalized primary IPO proceeds spend 48% of their market value for acquisitions in the first five years after going public, but firms with lower primary IPO proceeds spend only 11% for acquisitions. Panel C shows that the difference in acquisition volumes between these two subsamples is statistically significant.

Firms with higher primary IPO proceeds also exhibit greater R&D and CAPEX than firms with lower proceeds. However, the effect of raising more primary capital in the IPO is much larger for acquisitions than it is for R&D and CAPEX. This result suggests that raising acquisition capital might be a more important driver of the going public decision than raising capital for organic growth. Such a pattern might arise if overvaluation around the IPO leads firms to raise more primary proceeds (through a high offer price or by offering more shares) in the IPO. Overall, the univariate comparison is supportive of the capital infusion motive because the sale of primary shares raises investment capital for the firm, while the sale of secondary shares allows the insiders to monetize their holdings without providing a cash infusion to the firm.[7] Kim and Weisbach (2008) show a similar result for IPO and SEO

firms in which R&D, CAPEX, and acquisition amounts are greater for firms raising more primary capital than secondary capital.

To assess the role of acquisition currency, we also examine the effect of IPO underpricing in explaining subsequent stock-financed acquisition activity of the IPO firms. If the acquisition currency motive holds, IPO firms with greater underpricing should be more likely to undertake stock-financed acquisitions after their IPO to take advantage of their overvalued currency. The last five columns in Panel A of Table 4 present the normalized volume of stock-financed acquisitions along with normalized R&D and CAPEX for firms with greater than the median level of underpricing, and Panel B shows the results for firms with below the median level of underpricing. Consistent with a role for acquisition currency motives, we find that firms with greater underpricing conduct significantly more stock-financed acquisitions. We also observe a tendency for more underpriced IPOs to spend more on R&D and CAPEX, though the difference between the two groups is much smaller than the difference in acquisition spending.

3.4. M&A activity of IPO firms versus mature firms

The results in Table 4 suggest that industry effects are important in understanding the M&A actions of IPO firms. To determine if that is the entire story behind acquisitions by IPO firms, we compare the acquisition activity of IPO firms with that of mature public firms within their industry. While we do not have a clear prediction regarding this comparison, several factors suggest that IPO firms should be less active acquirers than mature companies. If IPO firms face more information asymmetry or greater valuation uncertainty, access to equity and debt capital could be less available to them than to mature firms. If IPO firms go public mainly to capitalize on attractive investment opportunities in their industries, one might expect a greater focus on internal investment by IPO firms, whereas mature firms might be more inclined to pursue acquisitions if their industries offer limited growth prospects. In addition, the typically smaller size of newly public firms could simply limit the number of feasible acquisitions these firms can pursue after the IPO. At the same time, IPO firms might be expected to be more active acquirers, if the desire to make acquisitions prompted the IPO or if they are more likely to be overvalued, prompting them to use their stock to finance acquisitions.

To provide perspective on these issues, we construct measures of acquisition activity for IPO firms and mature firms. Mature firms are defined as those that went public at least five years ago and have a market capitalization greater than $100 million (in 2004 dollars) at the beginning of the five-year period in which the two samples of firms are analyzed. We impose a $100 million size cutoff for mature firms so that they are of comparable size to the IPO firms.[8]

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[6] The possibility exists, however, that M&A expenditures are higher than R&D and CAPEX in less M&A-active industries due to undisclosed transaction values for M&A.

[7] We do not observe the same pattern if we use the amount of secondary shares sold in an IPO to split the sample. Firms with higher secondary IPO proceeds have a significantly lower total acquisition volume compared with firms with lower secondary IPO proceeds. These results cannot be driven by a size effect where large IPO firms have larger primary and secondary proceeds and also make more acquisitions. This is because we normalize IPO proceeds by firm size instead of simply using the dollar values of the proceeds. The differing patterns of M&A activity based on the splits between primary and secondary shares are also inconsistent with a size effect at work.

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[8] The median market value is $793 million for the sample of mature firms, compared with $600 million for the sample of IPO firms.

Table 5

Comparison of the acquisition activity over a five-year period of our sample of initial public offering (IPO) firms with that of mature firms.

Mature firms are defined as firms that have gone public at least five years ago and which have a market capitalization greater than $100 million (in 2004 dollars) at the beginning of the five-year period. We classify firms across the 12 Fama and French industries. For each industry and for each year from 1985 to 2004, we calculate the total number and the total volume of acquisitions conducted by each IPO firm (or by each mature firm) over the next five years, where the total volume is normalized by the market value of the firm at the beginning of the five-year period. Then, we pool all 20 years of firm data for each industry and calculate the mean number of acquisitions and the mean normalized acquisition amounts in each Fama and French industry to obtain a measure of the acquisition activity of an average IPO firm (or of an average mature firm) in that industry. Panel A reports the results for the number of acquisitions, and Panel B reports the acquisition volume results. Each panel first presents results for all (cash-or stock-financed) acquisitions, and then results for cash-financed acquisitions only and stock-financed acquisitions only. The z-statistics for the Wilcoxon-Mann-Whitney test are reported to compare the two groups of firms. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Industry	Consumer nondurables	Consumer durables	Manufacturing	Energy	Chemicals	Business equipment	Telecoms	Utilities	Wholesale and retail	Health care	Finance	Other
Panel A: comparison of the number of acquisitions by IPO firms and by mature firms												
Cash-and stock-financed acquisitions												
IPO firms	2.79	3.05	2.95	2.83	2.19	3.48	4.07	5.86	3.40	2.55	4.08	4.51
Mature firms	2.41	2.11	2.44	1.69	2.69	3.12	1.64	0.78	1.87	2.11	1.67	1.73
z-statistic	1.91*	1.74*	2.35**	3.46***	1.36	5.73***	9.99***	5.54***	4.14***	2.18**	12.49***	10.00***
Cash-financed acquisitions												
IPO firms	2.69	3.00	2.74	2.52	2.07	2.44	3.42	5.43	3.09	2.19	3.83	3.82
Mature firms	2.21	1.97	2.28	1.47	2.56	2.61	1.38	0.66	1.69	1.83	1.20	1.51
z-statistic	2.12**	1.90*	1.95**	3.33***	1.29	2.87***	9.03***	5.31***	3.70***	1.55	14.35***	9.38***
Stock-financed acquisitions												
IPO firms	0.10	0.05	0.22	0.31	0.11	1.04	0.64	0.43	0.31	0.36	0.24	0.69
Mature firms	0.20	0.13	0.16	0.22	0.14	0.50	0.26	0.12	0.18	0.27	0.47	0.21
z-statistic	−0.87	−0.87	1.58	1.22	−0.47	7.51***	6.34***	1.89*	1.54	0.89	−1.55	7.57***
Panel B: comparison of the acquisition volume as a percentage of market value of assets by IPO firms and by mature firms												
Cash-and stock-financed acquisitions												
IPO firms	14.84	13.86	13.83	33.40	18.30	21.65	38.73	43.91	14.60	14.12	51.07	24.10
Mature firms	9.74	8.80	10.17	14.95	7.60	15.90	15.72	4.66	6.84	11.30	5.32	9.17
z-statistic	2.13**	1.74*	2.98***	3.88***	2.48***	6.04***	10.50***	6.15***	3.74***	2.90***	10.55***	10.32***
Cash-financed acquisitions												
IPO firms	10.16	13.86	9.60	25.22	11.86	5.60	23.75	41.39	8.04	9.42	43.03	13.75
Mature firms	6.77	7.18	7.42	9.55	5.82	6.10	8.63	3.48	4.41	5.48	3.09	5.52
z-statistic	2.16**	2.06**	2.37**	3.75***	2.32**	1.61	8.94***	6.11***	3.34***	2.73***	12.90***	9.56***
Stock-financed acquisitions												
IPO firms	4.67	0.00	4.23	8.19	6.44	16.05	14.99	2.52	6.56	4.70	8.04	10.35
Mature firms	2.97	1.62	2.74	5.40	1.78	9.80	7.09	1.18	2.44	5.82	2.24	3.66
z-statistic	−0.22	−1.44	1.63*	0.84	−0.17	7.07***	6.92***	1.97**	1.69*	0.64	2.99***	7.21***

Our methodology for calculating the acquisition intensity of IPO and mature firms controls for industry- and time-trends in M&A activity. To calculate the acquisition intensity of IPO firms within an industry, we first classify the IPO firms across 12 Fama and French industries. For each industry and for each year from 1985 to 2004, we calculate the total number and the total volume of acquisitions conducted by each IPO firm over the next five years, where the total volume is normalized by the

market value of the firm at the time of the IPO. Then, we pool all the 20 years of firm data for each industry and calculate the mean number of acquisitions and the mean acquisition volumes in each Fama and French industry to obtain a measure of the acquisition activity of an average IPO firm in that industry. We repeat the same procedure for mature firms to calculate a comparable metric for the acquisition intensity of mature firms within an industry. For example, for 1985, we first find the total number and

volume of the acquisitions conducted by each mature firm from 1985 to 1989, where the total acquisition volume is normalized by the market value of the firm in 1985. We then pool 20 years of firm data for each industry and calculate the mean number of acquisitions and the mean acquisition volumes in each Fama and French industry to obtain a measure of the acquisition activity of an average mature firm in that industry.

The greater acquisition appetites of IPO firms cannot be explained by industry effects alone. Panel A of Table 5 presents that, in 11 of the 12 Fama and French industry groups, IPO firms make more acquisitions, on average, than mature public firms (at the 10% level of significance). In the remaining industry, Chemicals, the number of acquisitions does not differ between IPO and mature firms. The within-industry difference in acquisition intensity between IPO and mature firms appears to arise more from differences in cash-financed acquisitions than from stock-financed acquisitions. In ten of the 12 industry groups, IPO firms make more cash-financed acquisitions than mature firms (at the 10% level of significance), but they make more stock-financed acquisitions in only four industries. In no industry do mature firms make more acquisitions than IPO firms, either using stock or cash.

Looking at acquisition volume instead of the number of acquisitions portrays a similar picture. Panel B of Table 5 presents IPO firms engage in more acquisition activity relative to their market values than mature public firms in all 12 Fama and French industry groups. The difference in acquisition volumes between IPO and mature public firms is significant for all 12 industries at the 10% level and for 11 industries at the 5% level. Once again, this difference appears to arise predominantly because IPO firms engage in much more cash-financed M&A than mature firms. In 11 of the 12 industries, IPO firms engage in significantly more cash-financed M&A than mature public firms. Stock-financed M&A volumes are higher for IPO firms in seven of the 12 industries at the 10% level of significance.

Overall, these results suggest that IPO firms are more acquisitive than mature firms both in terms of the number and volume of acquisitions they undertake, despite the greater concentration of IPO firms in M&A-active industries. If sectoral acquisition opportunities were the only reason that IPO firms go public and make acquisitions, one would not expect to see meaningful differences between the acquisition intensity of IPO firms and mature firms within an industry. The within-industry comparison also shows that the difference in cash-financed acquisitions between IPO and mature firms is more pronounced than the difference in stock-financed acquisitions. A potential explanation is that industry-level overvaluation might lead both IPO and mature firms to engage in more stock-financed M&A, leading to smaller differences in acquisition patterns between these two groups of firms.

4. Multivariate analysis of post-IPO acquisition activity

We estimate separate regressions for the volume of cash-financed acquisitions and the volume of stock-financed acquisitions. Acquisition volumes are normalized by the market value of the firm at the time of the IPO. We estimate cross-sectional regressions for five different time periods, each denoted by $0t$, where year 0 corresponds to the IPO year and t ranges from 1 to 4 years after the IPO.

4.1. Primary and control variables

Our primary variables of interest are as follows. *Industry acquisition intensity* is the total volume of acquisitions within an industry normalized by the total market value of all firms in that industry. We use the 48 Fama and French (1997) industry groupings to assign IPO firms to industries. We calculate this variable for each time horizon considered in the regression models. If industry-level M&A opportunities are a primary motive for IPOs, we expect this variable to be positively related to post-IPO M&A volume.

4.1.1. Variables related to capital infusion
Primary IPO proceeds is the capital raised at the IPO from the sale of primary shares normalized by firm value at the time of the IPO. Under the capital infusion motive, we expect primary IPO proceeds to be positively related to cash-financed acquisitions because going public provides a war chest of cash to pursue subsequent cash-financed acquisitions. If capital infusion motives are important for IPOs, we expect this variable to be positively related to R&D and CAPEX.

Primary SEO capital is the total primary equity capital raised in SEOs from year 0 to year t following the IPO, normalized by firm value at the time of the IPO. One of the motives for an IPO can be to create access to public equity markets to raise funds for subsequent cash-financed acquisitions. If capital infusion motives drive the IPO decision because of the prospect of later SEOs that can be used to pay for cash-financed deals, we expect the volume of post-IPO cash-financed acquisitions to be positively related to the amount of primary equity capital raised in SEOs. Similar reasoning suggests that *primary SEO capital* should be positively related to R&D and CAPEX if capital infusion motives are important. Capital infusion motives do not offer a prediction regarding the effect of this variable on stock-financed acquisitions.

4.1.2. Variables related to acquisition currency
IPO underpricing is the price run-up on the first trading day after the IPO, defined as the difference between the first day closing price and the offer price, divided by the offer price. If acquisition currency motives are important in IPOs, we expect underpricing to be positively related to stock-financed acquisitions because IPO underpricing is positively correlated with overvaluation of the stock, as shown by Purnanandam and Swaminathan (2004).

FF alpha is the intercept estimated from the Fama and French three-factor model, which measures the firm's abnormal return from year 0 to year t. Because *IPO underpricing* is likely to be more reflective of overvaluation around the IPO, we use *FF alpha* as longer-term measure of overvaluation based on the post-IPO trading performance of the stock. If acquisition currency motives

are important, we expect this variable to be positively correlated with stock-financed acquisitions in later years. The abnormal stock price performance could be positively related to cash-financed acquisitions as well. An IPO firm with a well-performing stock could engage in cash-financed acquisitions by raising capital in an SEO and using the proceeds for cash-financed acquisitions. However, stock-financed acquisitions could have the advantage of removing the risk associated with SEO transactions and could take less time to complete than cash-financed acquisitions.

4.1.3. Variables related to ex ante uncertainty resolution

Offer price revision is calculated as the absolute value of the difference between the offer price and the midpoint of the initial filing range normalized by the midpoint of the initial filing range. As proposed by Lowry, Officer, and Schwert (2010) and Hsieh, Lyandres, and Zhdanov (2009), this variable reflects the reduction in ex ante uncertainty with regard to the true value of an IPO firm. Under the valuation uncertainty motive, the resolution of this uncertainty through an IPO allows firms and outsiders to observe the true value. This benefit is greater for firms with more reduction in their ex ante uncertainty and allows them to conduct more M&A activity. Thus, we expect this variable to be positively related to both cash- and stock-financed M&A for IPO firms.

IPO cost is calculated as the IPO spread divided by the share overhang, defined as the ratio of shares retained by nonselling shareholders to shares sold in an IPO, following Chen and Ritter (2000). The arguments in Hsieh, Lyandres, and Zhdanov (2009) suggest that firms with high *IPO cost* engage in M&A sooner than firms with low *IPO cost*. This timing differential is expected to hold for both cash- and stock-financed M&A.

Debt capital is the amount of total debt capital raised from year 0 to year t, normalized by firm value. We expect debt capital to be positively related to the cash-financed acquisitions because an IPO could improve a firm's ability to borrow and conduct debt-financed acquisitions by reducing the uncertainty about the firm's true value.

4.1.4. Control variables

Secondary IPO proceeds is the capital raised at the IPO from the sale of secondary shares, normalized by firm value at the time of the IPO. *VC-backed* is an indicator variable that takes the value of one if the IPO firm is VC-backed and zero if the IPO firm is not VC-backed. *Carve-out* is an indicator variable that takes the value of one if the IPO is a carve-out and zero if the IPO is a new company IPO. We lack a clear prediction for this variable. On the one hand, acquisition currency motives ought to be less important for carve-outs because the parent has the ability to issue stock prior to the IPO. On the other hand, sectoral mispricing for the carved entity could provide windows of opportunity for issuing overvalued stock that are unavailable to the parent. Finally, the regression models include year dummies.

4.2. Determinants of cash-financed acquisition activity

The first five columns in Table 6 present the regressions for cash-financed M&A activity. The results support the importance of capital infusion motives. The volume of cash-financed acquisitions made within the first one, two, three, and four years after the IPO is positively correlated with *primary IPO proceeds* at the 1% significance level. Unlike primary shares offered, the proceeds from secondary shares are unrelated to cash-financed acquisition volumes, confirming the role of capital infusion in explaining cash acquisition activity. The amount of primary equity capital raised subsequent to the IPO is also positively correlated with the amount of cash-financed acquisitions over horizons ranging from one year to four years after the IPO at the 1% significance level. This suggests that the ability to raise acquisition capital in SEOs subsequent to the IPO is an important element of the going public decision.

We find mixed support for the valuation uncertainty motive for cash-financed acquisitions. Consistent with the predictions of the model developed by Hsieh, Lyandres, and Zhdanov (2009), *offer price revision* is positively related to cash acquisitions conducted over the years 0–1 and 0–2 horizons. However, *IPO cost* is unrelated to cash acquisition volumes in any interval, contrary to their prediction that firms with higher costs of going public are likely to make more acquisitions in the earlier years. We also find the volume of cash-financed acquisitions is strongly and positively correlated with the volume of debt capital raised within one, two, three, and four years after the IPO. This result suggests that going public could enhance a firm's ability to undertake debt-financed acquisitions by improving its ability to borrow. This finding is consistent with the evidence in Pagano, Panetta, and Zingales (1998), who show that firms going public experience an improvement in their ability to borrow through a reduction in the cost of bank credit after the IPO. An IPO could increase debt capacity by lowering valuation uncertainty, thereby strengthening the firm's bargaining position vis-à-vis its lenders. Hence, in a broader sense, IPOs could facilitate M&A by resolving uncertainty about firm value, which allows the firm to undertake cash acquisitions financed by issuing debt.

A surprising result is that cash-financed acquisition volumes are not positively associated with industry M&A activity. In fact, over years 0–4, the coefficient on *industry acquisition intensity* is negative and statistically significant. This suggests that the earlier discussed link between IPO firm and industry M&A activity is driven by stock-financed transactions.

4.3. Determinants of stock-financed acquisition activity

The last five columns of Table 6 present regression analysis for the volume of stock-financed acquisitions. In contrast to the evidence from cash-financed acquisitions, *industry acquisition intensity* is a positive and significant determinant of stock-financed M&A volume in the IPO year and in the years 0–4. This suggests that industry level

Table 6
Regressions of cash- and stock-financed acquisitions by initial public offering (IPO) firms.

This table shows the results of regression models where the dependent variable is the total volume of cash- (or stock-) financed acquisitions over the period from year 0 (the IPO year) to year t, with $t=0,1,2,3,4$ denoting the number of years after the IPO, normalized by the market value of the firm at the time of the IPO (MVA_{IPO}). *Industry acq intensity$_{0t}$* is the total amount of industry acquisition activity from year 0 to year t normalized by the total market value of the firms in the industry, *primary IPO proceeds* (*secondary IPO proceeds*) is the capital raised at the IPO from the sale of primary (secondary) shares normalized by MVA_{IPO}, *primary SEO capital$_{0t}$* is the amount of total primary equity capital raised in seasoned equity offerings (SEOs) from year 0 to year t normalized by MVA_{IPO}, *IPO underpricing* is the price run-up in the first trading day after the IPO defined as the difference between the first day closing price and the offer price given as a percentage of the offer price, *FF alpha$_{0t}$* is the intercept estimated from the Fama and French three-factor model that measures the firm's abnormal return from year 0 to year t, *offer price revision* is the absolute value of the difference between the offer price and the midpoint of the initial filing range normalized by the midpoint of the initial filing range, *IPO cost* is the ratio of the IPO spread to the share overhang, defined as the ratio of shares retained by nonselling shareholders to shares sold in an IPO, *debt capital$_{0t}$* is the amount of total debt capital raised from year 0 to year t normalized by MVA_{IPO}, *carve-out* is an indicator variable that takes the value of one if the IPO is a carve-out, and *VC-backed* is an indicator variable that takes the value of one if the IPO firm is venture capital-backed. The regressions also include a constant term and year dummies that are not reported. For each independent variable, the first row reports its estimated coefficient; the second row, the corresponding t-statistic. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Independent variable	Dependent variable: total volume of cash-financed acquisitions					Dependent variable: total volume of stock- financed acquisitions				
	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4
Industry acq intensity	0.29	0.22	−0.07	−0.23	−0.59	0.16	0.12	0.09	0.15	0.16
	1.41	1.40	−0.60	−1.88*	−5.27***	2.62***	1.41	1.03	1.53	1.83*
Primary IPO proceeds	0.06	0.11	0.4	0.47	1.48	0.00	−0.00	−0.01	−0.02	−0.14
	5.14***	6.76***	21.19***	19.50***	25.37***	0.63	−0.11	−0.38	−1.03	−2.97***
Secondary IPO proceeds	0.11	0.08	0.19	0.09	0.25	−0.01	−0.02	−0.04	−0.09	−0.11
	1.41	0.72	1.49	0.51	1.09	−0.21	−0.39	−0.46	−0.59	−0.58
Primary SEO capital	0.86	0.37	0.50	0.02	0.75	−0.05	0.07	0.06	0.22	0.19
	2.49***	3.35***	6.87***	0.33	8.39***	−0.44	1.16	1.06	3.71***	2.73***
IPO underpricing	−0.02	−0.03	−0.03	−0.02	0.03	0.04	0.03	0.01	−0.00	−0.02
	−1.1	−1.34	−0.88	−0.48	0.7	6.71***	2.44**	0.27	−0.08	−0.43
FF alpha	−0.01	−0.23	0.17	0.05	0.53	−0.01	0.14	0.53	0.76	0.51
	−0.29	−1.24	0.56	0.12	0.95	−2.67***	1.35	2.43**	2.14**	1.17
Offer price revision	0.04	0.10	0.13	0.10	0.08	0.00	0.00	0.10	0.11	0.15
	0.91	1.71*	1.94**	1.11	0.66	0.02	0.11	1.95**	1.48	1.70*
IPO cost	−0.00	−0.00	−0.01	−0.00	−0.01	−0.00	−0.00	0.01	0.01	0.03
	−0.20	−0.13	−0.89	−0.03	−0.61	−0.54	−0.58	3.20***	1.87*	3.14***
Debt capital	4.44	4.29	3.65	3.44	1.38	−0.01	0.00	0.01	0.06	0.28
	135.78***	100.30***	73.85***	55.51***	11.44***	−0.87	0.06	0.23	1.09	2.98***
Carve-out indicator	−0.01	−0.00	−0.02	−0.04	−0.06	0.00	0.03	0.02	0.04	0.05
	−0.26	−0.05	−0.39	−0.77	−0.82	0.38	1.46	0.70	0.90	1.01
VC-backed indicator	−0.01	−0.03	−0.05	−0.05	−0.14	−0.00	0.02	0.06	0.05	0.05
	−0.34	−1.33	−1.75*	−1.29	−2.44**	−0.17	1.50	2.61***	1.42	1.10
Adjusted R^2	0.98	0.97	0.96	0.94	0.94	0.12	0.03	0.05	0.04	0.07
Sample size	898	974	928	829	676	898	974	928	829	676

M&A opportunities are a meaningful motive for IPO firms only for stock-financed transactions.

We find that firms with a higher degree of *IPO underpricing* conduct more stock-financed acquisitions after the IPO. The level of underpricing is a positive determinant of stock-financed acquisitions at the 1% level within the first year and at the 5% level within the first two years after the IPO. This effect of *IPO underpricing* in stock-financed acquisitions is in sharp contrast to the results for cash-financed acquisitions where *IPO underpricing* is essentially insignificant. This finding is supportive of the acquisition currency motive where firms go public to exploit acquisition opportunities when their equity is overvalued.

Models of IPOs, such as Rock (1986), predict underpricing is positively related to valuation uncertainty and this prediction has received empirical support (see, for example, Ritter, 1984). Hence, the importance of underpricing in stock-financed acquisitions could also be viewed as being consistent with a role for uncertainty resolution. However, under the uncertainty view, underpricing should also be positively related to cash-financed acquisitions because the benefit of an IPO emanates from establishing a public market valuation, irrespective of how the acquisition is financed. However, we find that underpricing is insignificant in explaining cash-financed acquisitions, suggesting that its role in explaining stock-financed acquisitions is more supportive of acquisition currency motives.

IPO underpricing loses significance for the longer windows that extend to year two and beyond. This likely occurs because overvaluation around the time of the IPO is unlikely to be a significant driver of M&A activity in later years. However, overvaluation appears to continue to play an important role for stock-financed M&A. Columns 8 and 9 show that *FF alpha* is positive and significant in regressions for stock acquisitions in the years 0–2 and years 0–3 windows. This evidence on overvaluation is supportive of the acquisition currency motive.

The evidence from stock-financed acquisitions also provides some support for valuation uncertainty motives. *Offer price revision* is positively correlated with the volume of stock-financed acquisitions in the first two- and four-year periods after the IPO. That this variable is significant in explaining both cash- and stock-financed M&A volumes is consistent with the prediction of the valuation uncertainty motive where the benefit of resolving ex ante uncertainty arises irrespective of the form of consideration.

A potential concern with the results on *offer price revision* is that it is highly correlated with the level of underpricing as shown by Hanley (1993) and Bradley and Jordan (2002). To understand whether the offer price revision is simply another measure of underpricing, we examine whether the two variables affect M&A volumes in an identical manner. In untabulated tests, we run separate regressions with either the offer price revision or underpricing. In these tests we find underpricing is significantly related to stock-financed acquisition volumes only, while offer price revision is significant in explaining both cash- and stock-financed acquisition volumes. This suggests that offer price revision plays a different role than underpricing in explaining acquisition volumes. Its significance in explaining both cash- and stock-financed acquisition activity is consistent with the predictions by Hsieh, Lyandres, and Zhdanov (2009).

We also find that *IPO cost* is not related to the volume of stock-financed acquisitions in year 0 and years 0–1. However, it is positively related to stock transactions over the longer horizons. This result is at odds with the prediction in Hsieh, Lyandres, and Zhdanov (2009) that firms incurring higher costs of going public engage in more acquisitions immediately after the IPO to outweigh their larger IPO costs. Combined with the insignificant role of *IPO cost* in explaining cash-financed M&A activity, we interpret our results as lacking support for this prediction of their model.

4.4. Discussion of hot IPO and M&A markets

To understand the extent to which our results might be driven by the intense IPO activity during the Internet boom, we repeat our analysis excluding IPOs conducted during January 1999 to March 2000, identified by Schultz and Zaman (2001) as the Internet bubble period. Our data show that 14% of our sample IPOs and 13% of acquisitions (with 23% of all stock-financed acquisitions) occur during this 15-month period, highlighting significant concentration of both IPO and M&A activity during the Internet boom. Yet, we find all the results described earlier hold when this period is excluded from the analysis. IPO firms continue to be prolific acquirers post-IPO, outpacing their M&A activity in the pre-IPO period and that of mature firms within their industry in the post-IPO period. All of the cross-sectional results on cash- and stock-financed M&A volumes continue to hold outside of the Internet boom period. We do not tabulate these results for brevity.

We also explore if our results are driven by periods of high M&A activity. We identify periods of an industry merger wave following Harford (2005), who defines an industry as experiencing an M&A wave if the number of acquisitions over two years exceeds the 95th percentile of the simulated probability distribution based on ten years of M&A activity. We consider an IPO firm to be an in-wave IPO if an M&A wave occurs in that industry in any of the five post-IPO years we study. Our sample is roughly evenly split between in-wave and out-wave IPOs.

As is to be expected, in-wave IPOs conduct more acquisitions than out-wave IPOs. We do not, however, find that our results are driven by in-wave IPOs. Even out-wave IPO firms spend as much on acquisitions as they do on R&D and CAPEX, and their acquisition volumes exceed those of mature firms within their industries. Inspection of our regression models shows similar results for in-wave and out-wave periods for cash-financed acquisitions. However, the results on underpricing in stock-financed acquisitions appear to be stronger for in-wave periods, possibly because overvaluation-driven acquisitions are more prevalent during a merger wave.

4.5. Determinants of post-IPO R&D and CAPEX

To obtain a complete picture of the growth pattern of IPO firms, we also estimate the determinants of R&D and CAPEX for IPO firms in Table 7. We find the amount of primary capital raised at the IPO is positively related to R&D and CAPEX of IPO firms in the years immediately after the IPO, but not over longer horizons. This suggests cash infusion motives have a longer-lasting effect on M&A activities than they do on organic growth.

Similar to the results on cash-financed M&A, *primary-SEO capital* has a positive and significant effect on R&D and CAPEX over all windows beyond the IPO year. This result confirms the findings in Kim and Weisbach (2008). In contrast to the evidence on cash M&A, however, proceeds from debt issuance have no explanatory power for R&D and CAPEX beyond the IPO year and are negatively related in the IPO year. Thus, the importance of uncertainty resolution in creating debt capacity appears to be restricted to M&A transactions.

Underpricing is unrelated to R&D and CAPEX outlays. Given our earlier results that underpricing is positively related to stock-financed acquisition volumes, this suggests that IPO firms experiencing a large run-up at the IPO prefer growth through acquisitions by using their valuable acquisition currency. This could be because it is easier and quicker to exploit an overvalued currency by acquiring other firms than it is to identify and invest in internal projects or because frictions such as lock-up restrictions prevent firms from conducting SEOs to raise cash for future organic initiatives.

Finally, an IPO firm's R&D and CAPEX is negatively correlated with the amount of acquisition activity in its industry for all the time periods after the IPO at the 1% level. Given this variable is positively correlated with stock-financed acquisition volume in the IPO year, a firm's acquisition activity and its R&D and CAPEX could be substitute paths for growing a company. We also find that,

Table 7

Regressions of research and development (R&D) and capital expenditures (CAPEX) by initial public offering (IPO) firms.

This table shows the results of regression models where the dependent variable is R&D and CAPEX over the period from year 0 (the IPO year) to year t, with $t=0,1,2,3,4$ denoting the number of years after the IPO, normalized by the market value of the firm at the time of the IPO (MVA_{IPO}). *Industry acq intensity$_{0t}$* is the total amount of industry acquisition activity from year 0 to year t normalized by the total market value of the firms in the industry, *primary IPO proceeds* (*secondary IPO proceeds*) is the capital raised at the IPO from the sale of primary (secondary) shares normalized by MVA_{IPO}, *primary SEO capital$_{0t}$* is the amount of total primary equity capital raised in seasoned equity offerings (SEOs) from year 0 to year t normalized by MVA_{IPO}, *IPO underpricing* is the price run-up in the first trading day after the IPO defined as the difference between the first day closing price and the offer price given as a percentage of the offer price, *FF alpha$_{0t}$* is the intercept estimated from the Fama and French three-factor model that measures the firm's abnormal return from year 0 to year t, *offer price revision* is the absolute value of the difference between the offer price and the midpoint of the initial filing range normalized by the midpoint of the initial filing range, *IPO cost* is the ratio of the IPO spread to the share overhang, defined as the ratio of shares retained by nonselling shareholders to shares sold in an IPO, *debt capital$_{0t}$* is the amount of total debt capital raised from year 0 to year t normalized by MVA_{IPO}, *carve-out* is an indicator variable that takes the value of one if the IPO is a carve-out, and *VC-backed* is an indicator variable that takes the value of one if the IPO firm is venture capital-backed. The regressions also include a constant term and year dummies that are not reported. For each independent variable, the first row reports its estimated coefficient; the second row, the corresponding t-statistic. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Independent variable	Dependent variable: Total R&D and CAPEX				
	Year 0	Years 0–1	Years 0–2	Years 0–3	Years 0–4
Industry acq intensity	−0.08	−0.22	−0.24	−0.23	−0.36
	−1.04	−3.29***	−3.23***	−2.77***	−3.96***
Primary IPO proceeds	0.02	0.01	−0.00	−0.01	−0.06
	3.26***	1.72*	−0.36	−0.38	−1.25
Secondary IPO proceeds	0.01	0.07	0.12	0.19	0.43
	0.32	1.45	1.54	1.43	2.16**
Primary SEO capital	−0.06	0.16	0.21	0.20	0.27
	−0.5	3.38***	4.85***	4.13***	3.88***
IPO underpricing	−0.01	−0.01	−0.02	−0.02	−0.03
	−0.81	−1.06	−1.22	−0.81	−0.75
FF alpha	−0.01	−0.02	0.03	0.16	0.84
	−1.64*	−0.24	0.17	0.54	1.91*
Offer price revision	−0.01	−0.01	−0.01	−0.05	−0.07
	−0.37	−0.43	−0.19	−0.76	−0.74
IPO cost	−0.00	0.00	0.00	0.00	0.00
	−0.29	0.69	0.39	0.22	1.15
Debt capital	−0.04	−0.03	0.01	0.01	0.11
	−2.91***	−1.36	0.40	0.17	1.16
Carve-out indicator	0.01	0.01	0.02	0.03	0.02
	1.27	0.70	0.85	0.87	0.28
VC-backed indicator	0.02	0.04	0.07	0.10	0.12
	2.43**	3.46***	3.83***	3.56***	2.67***
Adjusted R^2	0.07	0.07	0.05	0.04	0.06
Sample size	847	950	908	812	661

among the control variables, VC backing appears to be positively related to CAPEX and R&D.

5. Acquisitions and insider ownership dilution

There has been substantial interest in the evolution of firms' ownership structure. Helwege, Pirinsky, and Stulz (2007) show insider ownership of US firms drops steadily after they go public. They suggest this effect occurs due to insider selling after the IPO instead of the increase in the number of shares outstanding. Even when the number of shares outstanding increases, they argue that is because of option and warrant exercises, private equity placements, and conversion of equity securities. Their findings for US firms are in contrast to Franks, Mayer, and Rossi (2009), who show that share issuance for M&A is important in explaining the post-IPO ownership dilution of UK firms. Given the importance of post-IPO M&A activity, we examine whether it explains ownership dynamics of IPO firms in the US. Our measurement of insider ownership

follows Helwege, Pirinsky, and Stulz (2007), and we are able to collect data on insider ownership for 553 of 964 IPO firms that went public between 1989 and 2001.

Table 8 reports the evolution of insider ownership of IPO firms. Panel A shows the mean (median) level of insider ownership drops from 25.7% (18.2%) to 18.6% (7.8%) in the first five years after the IPO. Panel B shows high-acquisition activity IPO firms (those whose normalized acquisition volumes exceed the sample median) see a drop in mean (median) insider ownership from 27.1% (24.6%) to 17.9% (8.4%) in the first five years after the IPO. These reductions are statistically significant at the 1% level. For low-acquisition activity firms, we observe a smaller decrease. The mean insider ownership drops from 24.5% to 19.3%. Though the t-test indicates the drop is significant at the 10% level, the Wilcoxon test lacks statistical significance. Thus, IPO firms that are more voracious acquirers experience a greater reduction in insider ownership.

We estimate multivariate models of insider ownership dilution following the specifications in Helwege, Pirinsky,

Table 8

Evolution of insider ownership of initial public offering (IPO) firms.

This table shows the mean and the median of the percentage of shares owned by insiders of our sample of IPO firms, who are defined as officers and directors of those firms. Year t with $t=1,2,3,4$ corresponds to the number of years after the IPO. Panel A reports the statistics for all IPO firms, and Panel B and Panel C report statistics for IPO firms with normalized total acquisition volumes above and below the sample median of IPO firms, respectively. The t-statistics for comparison of means of the percentage of shares owned by insiders one year after the IPO and four years after the IPO, and the corresponding z-statistics of Wilcoxon-Mann-Whitney test are reported for IPO firms with high acquisition activity in Panel B and for IPO firms with low acquisition activity in Panel C. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Year	Number of firms	Mean	Median
Panel A: all IPO firms			
1	553	25.73	18.23
2	416	22.38	12.58
3	283	19.63	8.91
4	230	18.57	7.75
Panel B: IPO firms with high acquisition activity			
1	255	27.12	24.58
2	223	22.71	15.15
3	147	20.51	11.61
4	123	17.90	8.43
t-statistic	-3.97***		
z-statistic	-3.27***		
Panel C: IPO firms with low acquisition activity			
1	298	24.54	12.55
2	193	21.99	9.81
3	136	18.68	6.54
4	107	19.33	6.85
t-statistic	-1.80*		
z-statistic	-0.53		

and Stulz (2007), supplementing them with variables for cash- and stock-financed acquisitions. Both cash- and stock-financed acquisitions can lead to a drop in insider ownership because shares outstanding increase if SEOs are used to raise capital for cash acquisitions or if shares are issued in stock acquisitions. To evaluate whether cash acquisitions explain ownership dilution, we focus on SEOs that raise capital through the sale of primary shares around the announcement of a cash acquisition. Cash acquisitions dilute insider ownership only if they are financed through an SEO with the sale of primary shares. Hence, we use the volume of cash-financed acquisitions accompanied by the sale of primary shares from six months before to six months after the announcement of a cash-financed acquisition. As a control, we also include the volume of cash acquisitions not preceded or followed by SEOs involving primary shares in the 12 months around the announcement of a cash-financed acquisition.

Inspection of the SEOs around cash acquisitions reveals an interesting pattern. The primary proceeds raised through an SEO represent, on average, 225% of the volume of cash-financed M&A around the SEO. Thus, the sale of shares provides much of the financing for this sample of cash-financed M&A suggesting that the ability to conduct SEOs is an important channel through which IPOs

facilitate M&A activity. In some respects, this channel could be even more important than the ability to use stock as the method of payment in the transaction. In the stock-financed M&A transactions in our sample, equity represents only 77.2% of the consideration on average. Controlling for transaction size, therefore, the potential dilutive effect of SEO funded cash M&A could be even greater than that of stock-financed M&A.

The first column in Table 9 presents probit model estimates of the probability of a drop in the percentage of shares owned by insiders of 5% or more and the second column estimates a model for a drop of 1% or more in insider ownership. Ordinary least squares estimates for the change in insider ownership as the dependent variable are in the third column. These models are estimated by pooling all firm-years through years 0 to 4. Similar results hold for shorter intervals.

We confirm the main findings in Helwege, Pirinsky, and Stulz (2007) that firms with higher stock returns and higher stock liquidity are more likely to experience a drop in insider ownership. More important, volumes of both stock-financed acquisitions and cash acquisitions accompanied by primary SEOs are associated with dilution in insider ownership. The coefficient on *SEO financed cash acquisition volume* is consistently greater than that on *stock acquisition volume*. A potential explanation is that SEO financed cash M&A is funded almost entirely through equity issuance, whereas stock-financed M&A typically also involves some nonstock consideration. In contrast, cash acquisitions unaccompanied by an SEO do not explain dilution in insider ownership. Thus, cash acquisitions are associated with a reduction in insider ownership only when accompanied by the sale of primary shares.

The next three models of Table 9 illustrate a link between insider ownership dilution and M&A-related SEO activity. These models replace cash acquisition volumes with the volumes of primary and secondary SEO capital raised as independent variables. We differentiate between primary SEOs that are accompanied by cash-financed acquisitions in the six months before or after the SEO and those that are not accompanied by a cash acquisition during this period. We include the volume of secondary shares sold in SEOs as an additional variable to assess the effect of insider sales in SEOs on the change in insider ownership.

The results show that the volume of primary SEO issuance around cash acquisitions is a significant determinant of insider ownership dilution in IPO firms. In contrast, primary share issuance for reasons other than acquisitions is unrelated to insider ownership dilution. Thus, cash-financed M&A activity appears to play an important role in explaining the effect of SEO activity on insider ownership dilution. These results suggest that managers tend to offset the dilutive impact of nonacquisition-related SEOs on their ownership, possibly by increasing their personal shareholdings. We also find that secondary share issuance volume is insignificant in explaining the drop in insider ownership. This indicates increases in the number of shares outstanding due to cash-financed acquisitions play a more important role in explaining dilution in insider ownership than decreases in

Table 9

Factors affecting the change in insider ownership of initial public offering (IPO) firms.

Columns 1 and 4 (columns 2 and 5) show probit estimates of the probability of a drop in insider ownership, where the dependent variable takes a value of one if there is a drop in the percentage of shares owned by insiders of 5% or more (of 1% or more) in a given year. Columns 3 and 6 show estimates of ordinary least squares (OLS) regressions of a change in the percentage of shares held by insiders. *Insider ownership* is the percentage of shares owned by insiders at the beginning of the year, *stock acq volume* is the total volume of stock-financed acquisitions, *SEO financed cash acq volume* is the total volume of cash-financed acquisitions accompanied by a seasoned equity offering (SEO) six months before or six months after the announcement of the acquisition, *non-SEO financed cash acq volume* is the total volume of cash-financed acquisitions that are not accompanied by an SEO six months before or six months after the announcement of the acquisition, *primary SEO volume around cash acq* is the volume of SEO transactions with the sale of primary shares six months before and six months after the announcement of a cash-financed acquisition, *primary SEO volume with no cash acq* is the volume of SEO transactions with the sale of primary shares that do not precede or follow a cash-financed acquisition, *secondary SEO volume* is the volume of SEOs with sale of secondary shares, *CAPEX* is capital expenditures, *R&D* is research and development expenditures, *total Assets* is the logarithm of the book value of assets, *stock turnover* is the average turnover of the firm's stocks computed by dividing the average monthly volume by the float (number of shares outstanding minus number of shares held by insiders), *lagged firm return/firm return* is the annual stock return of the firm, *lagged industry return/industry return* is the annual value-weighted industry return, *lagged market return/market return* is the annual value-weighted market return, *BTM* is the book-to-market equity ratio of the firm, *carve-out* is an indicator variable that takes the value of one if the IPO is a carve-out, *VC-backed* is an indicator variable that takes the value of one if the IPO firm is venture capital-backed, *PPE* is property, plant, and equipment, *free cash flow* is free cash flow defined as earnings before interest, taxes, depreciation, and amortization (EBITDA), *leverage* is total liabilities, and *dividend* is an indicator variable that takes the value of one if the firm has paid a dividend. All explanatory variables refer to the previous year, except for *firm return*, *industry return,* and *market return,* which are contemporaneous returns. The variables with dollar values (except for *total assets*) are normalized by the book value of assets. The regressions include a constant term that is not reported. For each independent variable, the first row reports its estimated coefficient; the second row, the corresponding z-statistic for the probit models and the corresponding t-statistic for the OLS models. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Independent variable	dependent variable					
	Insider ownership drop ≥ 5% (1)	Insider ownership drop ≥ 1% (2)	Change in insider ownership (3)	Insider ownership drop ≥ 5% (4)	Insider ownership drop ≥ 1% (5)	Change in insider ownership (6)
Insider ownership	2.43	2.29	−0.24	2.45	2.30	−0.24
	10.11***	10.20***	−12.53***	10.12***	10.20***	−12.55***
Stock acq volume	0.27	0.31	−0.01	0.27	0.31	−0.01
	1.69*	1.87*	−1.08	1.68*	1.88*	−1.13
SEO financed cash acq volume	2.86	1.65	−0.19			
	3.06***	1.81*	−2.63***			
Non-SEO financed cash acq volume	−0.02	−0.03	0.01			
	−0.23	−0.34	0.64			
Primary SEO Volume around Cash acq				3.78	1.79	−0.17
				3.67***	1.80*	−2.12**
Primary SEO volume with no cash acq				0.38	0.40	−0.10
				0.49	0.56	−1.59
Secondary SEO volume				0.60	0.41	−0.03
				1.55	1.08	−0.91
CAPEX	0.72	−0.19	0.04	0.68	−0.22	0.04
	1.13	−0.32	0.72	1.07	−0.36	0.80
R&D	1.32	1.77	−0.18	1.48	1.81	−0.18
	1.58	2.17**	−2.55***	1.77*	2.23**	−2.55***
Total assets	0.03	0.06	−0.02	0.03	0.06	−0.02
	0.52	1.20	−4.16***	0.51	1.25	−4.31***
Stock turnover	0.56	0.33	−0.01	0.60	0.34	−0.01
	2.46***	1.40	−1.54	2.63***	1.46	−1.73*
Lagged firm return	−0.01	−0.01	0.01	0.001	−0.0003	0.0003
	−0.07	−0.31	4.88***	0.03	−0.27	4.82***
Lagged industry return	−0.11	0.07	0.07	−0.14	0.06	0.07
	−0.38	0.26	2.68***	−0.46	0.2	2.77***
Lagged market return	0.26	0.44	−0.05	0.25	0.46	−0.05
	0.51	0.93	−1.15	0.49	0.96	−1.19
Firm return	−0.01	0.09	−0.01	−0.004	0.10	−0.002
	−0.24	1.54	−0.32	−0.06	1.64*	−0.42
Industry return	0.50	0.37	−0.10	0.49	0.35	−0.10
	1.98**	1.54	−4.88***	1.94**	1.47	−4.79***
Market return	−0.24	−0.13	0.13	−0.29	−0.12	0.13
	−0.41	−0.25	2.90***	−0.51	−0.23	2.86***
BTM	−0.04	−0.11	0.01	−0.001	−0.10	0.01
	−0.49	−1.74*	1.03	−0.01	−1.56	0.91
Carve-out indicator	−0.22	−0.39	−0.01	−0.21	−0.38	−0.01
	−1.14	−2.34**	−0.74	−1.11	−2.29**	−0.80
VC-backed indicator	0.51	0.56	−0.03	0.50	0.55	−0.03
	4.08***	4.73***	−2.84***	4.00***	4.70***	−2.79***
PPE	−0.37	−0.32	−0.01	−0.32	−0.30	−0.01
	−1.88*	−1.88*	−0.74	−1.62	−1.75*	−0.89
Free cash flow	0.53	0.77	−0.07	0.57	0.76	−0.07

Table 9 (continued)

Independent variable	dependent variable					
	Insider ownership drop ≥ 5% (1)	Insider ownership drop ≥ 1% (2)	Change in insider ownership (3)	Insider ownership drop ≥ 5% (4)	Insider ownership drop ≥ 1% (5)	Change in insider ownership (6)
	1.93**	2.83***	−2.95***	2.06**	2.80***	−2.82***
Leverage	0.04	−0.18	0.02	0.14	−0.14	0.02
	0.21	−0.98	1.28	0.68	−0.76	1.11
Dividend indicator	−0.13	−0.16	−0.01	−0.13	−0.15	−0.01
	−0.81	−1.20	−0.79	−0.84	−1.18	−0.81
Pseudo/adjusted R^2	0.26	0.24	0.23	0.27	0.24	0.23
Sample size	891	891	891	891	891	891

insider shares owned due to insider selling in secondary offerings. These results are in contrast to the argument in Helwege, Pirinsky, and Stulz (2007) that insider selling is the primary reason for ownership dilution in IPO firms.

Overall, our results on the insider ownership dilution of newly public firms are similar to those in Franks, Mayer, and Rossi (2009), who show the number of shares issued for acquisition financing is positively related to the ownership dilution of UK firms. Thus, adding the acquisition activity to the Helwege, Pirinsky, and Stulz (2007) framework illustrates that the M&A activity of IPO firms is an important determinant of ownership structure evolution in the US as well.

6. Conclusions

We examine the acquisition activity of newly public firms. Our results show acquisitions play a central role in the growth of IPO firms. The M&A activity of these firms increases substantially from their pre-IPO levels and outpaces the acquisition volumes of mature firms. The elevated M&A volumes partly reflect the tendency of IPOs to cluster in M&A-intensive industries, but industry-level M&A volumes do not fully explain the acquisition appetite of IPO firms.

We evaluate three motives for the post-IPO M&A activity of newly public firms. IPOs appear to facilitate M&A both by providing an infusion of capital and by providing ongoing access to capital markets. We find that IPO firms acquire other firms early on after the IPO by using the primary capital raised at the IPO. In addition, they use their access to public equity markets to finance their acquisition activity. Improved access to credit markets also appears to be important as the volume of debt capital raised is strongly correlated with cash-financed M&A volumes. Thus, the initial capital raised as well as the ongoing access to public equity and debt markets are significant factors underlying M&A activity of these firms.

Our findings also lend support to the view that an IPO creates an acquisition currency that facilitates the subsequent M&A activity. We find IPO firms with over-valued stock conduct more stock-financed acquisitions.

We also find some support for the view that IPOs improve the ability of firms to conduct M&A by resolving some of the ex ante valuation uncertainty facing privately held firms.

Overall, our results suggest the desire to make acquisitions is an important factor behind the IPO decision and acquisitions play a substantial role in the growth of newly public firms. We also find subsequent equity and debt issuance is closely linked to post-IPO acquisition activity. Therefore, our findings illustrate that the IPO decision, subsequent equity and debt offerings, and acquisition activity are all closely linked. Thus, future research on IPOs could benefit from considering the interaction between their financing and acquisition activities.

Our findings on the importance of M&A for IPO firms have broader implications for the evolution of ownership structure of IPO firms as well. We find that the acquisition activity of IPO firms plays an important role in explaining the reduction in insider ownership, in addition to stock market performance and liquidity as shown by Helwege, Pirinsky, and Stulz (2007). Our analysis shows that IPO firms with a higher amount of acquisition activity are more likely to experience a sizable drop in insider ownership than IPO firms with a lower amount of acquisition activity.

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