JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS Vol. 54, No. 3, June 2019, pp. 1263–1283

doi:10.1017/S0022109018000893

At-the-Market Offerings

Matthew T. Billett, Ioannis V. Floros, and Jon A. Garfinkel*

Abstract

We study at-the-market (ATM) equity offerings, which are direct share issuances sold in the secondary market that forgo underwriters and "dribble-out" shares over time rather than raising them all at once. Enabled in 2008, their use has increased dramatically, and in 2016, their incidence and total proceeds were, respectively, 63% and 26% of those for seasoned equity offerings (SEOs). Determinants of firms' choice between ATMs and SEOs are consistent with the costly certification hypothesis of Chemmanur and Fulghieri (1994). We also find that 65% of ATM proceeds are used to stockpile cash compared to 84% of SEO proceeds.

I. Introduction

Equity issuance to public market investors in the United States has traditionally followed the firm commitment process (Eckbo, Masulis, and Norli (2007)). Explanations for the dominance of this underwritten offering approach include the certification that investment banks provide to issuers of uncertain quality, as well as liquidity provision and marketing services (Booth and Smith (1986), Gao and Ritter (2010)). While the needs for and costs of certification, liquidity provision, and marketing likely vary between firms, across time, and with the intended use of proceeds, few follow-on equity issues bypassed the underwriting services of an investment bank. However, that changed in 2008 with the introduction of at-the-market (ATM) equity issues.[1]

*Billett (corresponding author), mbillett@indiana.edu, Indiana University Kelley School of Business; Floros, ivfloros@uwm.edu, University of Wisconsin–Milwaukee Lubar School of Business; and Garfinkel, jongarfinkel@uiowa.edu, University of Iowa Tippie College of Business. We are grateful to Paul Malatesta (the editor) and especially Jay Ritter (the referee) for guidance and suggestions. We also thank Audra Boone, Dave Mauer, Daniel C. de Menocal, Jr., Ann Sherman, Joshua White, and seminar participants at the University of Mississippi for helpful comments. Part of the analysis in the paper was completed while Floros was visiting the U.S. Securities and Exchange Commission (SEC). The views expressed herein are those of the authors and do not necessarily represent the views of the SEC. Jeffrey Emrich, Jinsook Lee, and Dongping Xie provided excellent research assistance.

[1] ATMs were actually allowed as early as the 1980s but were rarely used because of institutional restrictions. Prior research has noted the use of best efforts offerings as an alternative to firm commitment offerings. Our analysis of the ATM indicates that they have replaced best efforts deals.

Regulatory changes in 2005 and 2008 (the 2005 Securities Offering Reform (SOR) and amendments to forms S-3 and F-3 in 2008) facilitated ATM issuances. These are direct-from-shelf placements of nonunderwritten shares into the secondary market using a placement agent strictly as a broker. ATMs offer immediacy at the potential cost of foregone certification and marketing (thereby relying on existing stock market demand for the firm's shares). ATMs also offer two implicit options: the firm may issue less than the authorized amount, and they may "dribble out" the shares in smaller and variable quantities over 3 years.

This paper is the first comprehensive empirical study of ATMs. We offer several lines of inquiry, beginning with a basic description of the anatomy of the market along with that for seasoned equity offering (SEO) and private investment in public equity (PIPE) activity over the same period. We also describe ex ante characteristics of ATM and SEO firms and explore firms' choices between the two issuance approaches. We finish with two ex post perspectives: ATM firms' actual dribble-out activity and their propensity to save cash from the issuance proceeds (compared to that for SEOs).

Our broad market analysis provides an overall picture of how ATMs have expanded the equity issuance landscape. We find ATMs are an important and increasingly viable equity issuance method. They occur frequently among nonregulated and nonfinancial firms, with 682 programs announcing over $62 billion in (potential) issuance during our 2008–2016 sample window.[2] Their use has also grown in comparison to SEOs and PIPEs. In 2008, ATMs were issued 10% as frequently as SEOs (and 0.7% as frequently as PIPEs). Also, in 2008, relative proceeds of ATMs to SEOs were 1.6% and those relative to PIPEs were 1.9%. Relative incidences grew to 63.6% and 14.4% in 2016, while relative proceeds grew to 25.8% and 40.5% in 2016. It appears that ATMs have become a common method for publicly traded firms to raise equity capital.

Our comparison of ex ante firm characteristics for ATM and SEO users indicates several important differences. ATM firms tend to be smaller with lower sales and profitability than SEO firms. They also carry larger cash balances and invest more via research and development (R&D). They have higher market-to-book ratio and lower leverage. In short, ATM firms have the markings of growth-oriented firms with potentially greater asymmetric information concerns. The latter concerns provide the theoretical underpinning for exploring (via logit) firm selection of the issuance method as either ATM or SEO.[3]

Specifically, we test one implication of Chemmanur and Fulghieri (1994). Their model primarily predicts the well-documented value of greater investment bank reputation in the form of mitigated adverse selection costs experienced by issuers. However, their implication number 6 focuses on firm choice of direct versus underwritten equity issuance. Greater asymmetric information encourages firms to use underwritten equity offerings, but this incentive is mitigated by higher costs of certification among lower quality firms. In other words, the likelihood of

[2] ATMs are popular among financials, particularly REITs. We eschew analysis of these because they are not typically included in SEO samples, and we seek comparability.

[3] We do not include PIPEs in later analyses because their initial placement is privately negotiated with a typically small number of qualified institutional buyers very different from the investor set for ATMs and SEOs.

an SEO (instead of an ATM) should increase in the interaction of asymmetric information concerns and firm quality. We use financial reporting quality to proxy for firm-level asymmetric information concerns or opacity (e.g., Lee and Masulis (2009)) and future analyst recommendations to proxy for firm quality. The empirical likelihood of an SEO rather than an ATM increases in the interaction of firm opacity and quality, consistent with theory.

Finally, our two ex post perspectives on ATMs highlight their completion and timing option benefits. Firms take down less than half of the announced ATM program allocation, on average, but more than one-third of programs are completed (100% takedown). More generally, ATM takedown activity positively correlates with current quarter stock performance. Our results on cash savings out of ATM issuance suggest that the dribble-out option mitigates the need to carry financial slack (cash and marketable securities holdings). Regression analysis implies that ATM firms save 65 cents out of each dollar compared with SEO firms, which save 84 cents per dollar of issuance (in our sample).

Overall, our research makes several contributions. As noted above, our primary contribution is to provide the first comprehensive analysis of this new follow-on equity issuance technique. Given their temporal usage growth in both absolute terms and relative to both SEOs and PIPEs, ATMs are likely a permanent fixture in the equity issuance landscape for publicly traded firms. Second, we explore the determinants of the firm choice of an ATM versus SEO and test one implication of Chemmanur and Fulghieri (1994). The results are important for understanding corporate financial policy decisions. We also contribute to the literature on precautionary savings of corporate issuance (McLean (2011)), showing that the use of ATMs may mitigate the need for it given their more continuous availability of financing over time.

Our research speaks to the importance of regulatory policy for firm financing policies. The change in regulations in the 2005 SOR, which allowed for the immediate issuance of shares off the shelf, opened the door for firms to issue shares under favorable market conditions (a key motive behind dribbling out shares). The 2008 amendments to Form S-3 increased access to shelf registration for smaller firms, which also encouraged ATMs. Our research adds to the literature on the importance of regulation for capital acquisition (e.g., Gustafson and Iliev (2017)).

Finally, our work extends the analysis of Gao and Ritter (2010), who study the choice of accelerated SEOs versus traditional book-built SEOs. Their empirical analysis covers 1996–2007, which is prior to the emergence of ATMs. They show that inelastic share demand and large offerings encourage the use of marketing services associated with traditional book-built SEOs. Our analysis suggests that ATMs offer a viable alternative issuance technique to accelerated SEOs. Both accelerated SEOs and ATMs eschew marketing efforts that may be used to flatten the short-run demand curve for shares. The potential advantage of ATMs, particularly of stocks with lower institutional demand, is the smaller price impact when fewer shares are issued at a single point in time, but the firm spreads its total offering over a longer window.

The remainder of our paper is organized as follows: Section II describes the changes in regulation (in 2005 and 2008) and how they encouraged ATM issuance activity. Section III presents our data, emphasizing the growth in ATM use

(relative to SEO and PIPE use) over time as well as the different procedures for issuing equity in those forms. Section IV describes firm characteristics and their influence on the choice of issuance technique (ATM vs. SEO). Section V explores actual issuance behavior under ATM programs. Section VI concludes.

II. Regulatory Reform

The U.S. Securities and Exchange Commission's (SEC) SOR policy became effective on Dec. 1, 2005. There were several broad motives to the reform. One was to allow more disclosure prior to follow-on equity offerings and to reduce asymmetric information problems that impede capital formation (e.g., Clinton, White, and Woidtke (2014), Shroff, Sun, White, and Zhang (2013)). A second listed intent was to define a new category of issuer, a well-known seasoned issuer (WKSI) that meets the following criteria:[4]

> …has worldwide market value (public float) of its outstanding voting and non-voting common equity held by non-affiliates of $700 million or more; or has issued in the last 3 years at least $1 billion aggregate principal amount of non-convertible securities, other than common equity, in primary offerings for cash (and not in exchange) registered under the Securities Act, and will register only non-convertible securities other than common equity.

A third motive was to provide more timely information to investors without mandating delays in the offering process. This opened the door to offering securities from the shelf very quickly after the firm decided to do so. In particular, SOR removed requirements to file a post-effective amendment that contained underwriter names.

ATMs were still effectively prohibited by SOR. For large firms, issuance size limitations (when pulling shares off the shelf) were the likely deterrents to ATMs and were a specific concern noted by the SEC. For small firms, defined as those firms with less than $75 million in public float, issuing shares off the shelf (and, hence, ATMs) was specifically prohibited (Gustafson and Iliev (2017)).

Both concerns were addressed in Jan. 2008 with revisions to requirements governing issuance via SEC forms S-3 and F-3. Key revisions encouraging ATM activity broadened the set of companies eligible to issue securities off the shelf and increased the allowable size of issuances. Regarding the former, the SEC removed the "public float" restriction to defining WKSI companies, as long as the issuers met other eligibility conditions for the use of Form S-3. This had the net effect of allowing companies with less than $75 million in public float to issue via the shelf. Commenters on the SEC's proposed amendments (governing S-3 and F-3 policy) welcomed expansion of the eligibility, noting potential enhancement to smaller companies' access to capital.

The SEC further amended regulations that had previously restricted the value of securities that could be sold in an ATM to 10% of the issuer's aggregate market

[4]See "Frequently Asked Questions about Communications Issues for Issuers and Financial Intermediaries" by law firm Morrison & Foerster LLP (2017): https://media2.mofo.com/documents/faq_communications.pdf

value of the outstanding voting stock held by nonaffiliates. The new policy allows for fully one-third of public float to be issued within any 12-month period. This latter change opened the door to larger issues by qualified firms (WKSIs).

In sum, the 2005 SOR sped up issuance times particularly through removal of post-effective amendment filing. The 2008 changes to forms S-3 and F-3 increased both the breadth of companies eligible to issue securities and the allowed issuance amount relative to the firm's public float. These changes likely broadened and deepened corporate interest in ATM use.

III. Data

A. ATM and SEO Samples

Our study is built around two samples of follow-on equity issuance: ATMs and SEOs. The (main analysis) sample window spans the period of Jan. 1, 2008 to Dec. 31, 2015.[5] Our SEOs are drawn from the Securities Data Corporation (SDC) database (U.S. common stock issuances). Our sample of ATMs is primarily hand collected, but also draws from The Deal's PrivateRaise database in 2011–2015 to confirm our hand-collected data.

For our hand collection of ATM data, we use the Knowledge Mosaic platform to search all 8-K and 6-K filings for the keywords: "at-the-market," "at the market," "controlled equity offering," "sales agency agreement," and "distribution agreement." We also search for "ordinary brokers" in 8-Ks and 6-Ks that are non-registration statements (to avoid getting 424B2–424B5 filings). We do not sample regulated or financial firms. Our initial ATM sample includes 682 announced equity agreements.

Our ATM data include issuer name, closing date, placement status, planned issuance amount (available for 625 of 682 ATMs), ticker symbol, listing exchange, SIC code, issuer country and state, closing market price and capitalization, planned use of proceeds, roster of placement agents, and agent fees charged. We obtain the commitment period within which the issuing company commits itself to dribble out some or all of the ATM shares (though this does not place any legal obligation on the issuer). All ATM specifics are available in Item 1.01 of the respective 8-K/6-K filing. We gather ATM announcement dates from Factiva.com (only 9 ATMs have announcement dates preceding their initialization date).

Our SEO sample is drawn from the SDC database and includes only firm commitment common stock offerings in the United States. Our specific filtering criteria are the following (with available number of observations after imposing each criterion in parentheses): i) all firm commitment follow-on offerings between Jan. 1, 2008 and Dec. 31, 2015 (18,157); ii) no rights issues (15,174); iii) issuer Standard Industrial Classification (SIC) code not including regulated or financial industry or real estate investment trust (REIT) firms (11,185); iv) issuer is traded on any of the main U.S. stock exchanges (New York Stock Exchange (NYSE), (now NYSE MKT LLC), NASDAQ, NASDAQ SmallCap) (2,842); v) no unit issues (2,842); vi) no leveraged buyout or reverse leveraged buyout firms (2,837);

[5] All but the basic calendar-year data in Table 2 are based on this sample. For the 2016 ATM, SEO and PIPE activity information in Table 2, we collect only the number of events and quantities raised.

vii) no limited partnerships (2,612); viii) no American depositary receipts (2,540); ix) no simultaneous international offerings (2,524); and x) with an offering price exceeding $5 (1,950). These screens are broadly consistent with the extant literature studying SEO activity.

B. Market Differences

Panel A of Table 1 lists the different procedures for issuing equity via ATMs and SEOs. ATM-offering shares are sold strictly into the secondary market. A placement agent is chosen by the firm and essentially acts as a broker of the shares in sales on the open secondary market. SEO shares are sold in primary market transactions and typically involve a firm commitment by the underwriter. ATM issuance programs may be executed over time with only a fraction of shares sold during each visit (by the placement agent) to the secondary market. By contrast (firm commitment), SEOs involve the issuance of shares in a single transaction.

TABLE 1
Institutional Characteristics of ATMs, SEOs, and PIPEs

Panel A of Table 1 describes the main characteristics of two types of equity offerings: ATMs and common stock SEOs. Panel B describes the main characteristics of PIPEs. The source for SEOs is the Securities Data Corporation (SDC) database; for ATMs, it is both The Deal's PrivateRaise and our hand collection. The data source for PIPEs is The Deal's PrivateRaise. The announcement date for ATMs is hand gathered from Factiva.com, as well as 8-K statements. Event dates for SEOs are drawn from the SDC. Announcement dates for PIPEs (both unregistered stock and registered stock) come from The Deal's PrivateRaise.

Panel A. ATMs and SEOs

	Announced before Completion	Sold in the Secondary Market	Sold in Increments	Underwritten
ATMs	We find that 95.4% of ATM programs are announced on (or after) the closing date of the commencement of the program. The dates of the securities' sale are not announced.	Through ATMs, newly issued shares are sold to the secondary markets.	Yes	Through ATMs, newly issued shares are dribbled out into the trading market through a designated broker-dealer at prevailing market prices. There is a placement agent used who acts on a best efforts basis. In the rare case that the placement agent commits to purchase the issuer's securities for his own account with a view to reselling securities, he does not conduct any roadshows or other solicitations. The placement agent is still liable with respect to material misstatements or omissions in the accompanying shelf registration statement.
SEOs	We find that 89.1% of SEO issuances have their filing date preceding the issue date.	Through SEOs, pure primary or combined primary and secondary shares (with the primary shares proportion being at least 50% of the entire offering) are sold to the secondary markets.	No	SEO issuers use underwriters who act on a firm commitment basis.

(continued on next page)

TABLE 1 (continued)
Institutional Characteristics of ATMs, SEOs, and PIPEs

Panel B. PIPEs

	Announced before Completion	Sold in the Secondary Market	Sold in Increments	Underwritten
PIPEs: Unregistered stock	We find that 61.9% of unregistered stock PIPEs have their first announcement date preceding the closing date.	Unregistered stock PIPEs refer to private placements of either newly issued shares of common stock or shares of common stock held by selling stockholders (or a combination of primary and secondary shares) offered primarily to accredited investors.	No	In unregistered stock PIPEs, 46.0% use the services of a placement agent. The placement agent is not obligated to buy any shares that are offered and cannot engage in market stabilizing transactions. The placement agent acts as a distribution participant and could be considered an underwriter only in the sense of introducing new securities to the market. The placement agent is simply intermediating the sale to institutional investors, as no retail investors participate in registered stock PIPEs (RDs).
PIPEs: Registered stock (RDs)	We find that 52.4% of registered stock PIPEs (RDs) have their first announcement date preceding the closing date.	Registered stock PIPEs (RDs) refer to private placements of either newly issued shares of common stock or shares of common stock held by selling stockholders (or a combination of primary and secondary shares) offered primarily to accredited investors.	No	In registered stock PIPEs (RDs), 89.9% use the services of a placement agent. The placement agent is not obligated to buy any shares that are offered and cannot engage in market stabilizing transactions. The placement agent acts as a distribution participant and could be considered an underwriter only in the sense of introducing new securities to the market. The placement agent is simply intermediating the sale to institutional investors, as no retail investors participate in registered stock PIPEs (RDs).

PIPE issuance procedures are described in Panel B of Table 1. Buyers are institutional or accredited investors. The firm uses a placement agent rather than an underwriter, and this agent does not engage in any market stabilization. PIPEs are often placed with hedge funds, other corporations, and private equity firms, and the PIPE contracts often contain provisions with specific investor protections and/or control rights (see Billett, Elkamhi, and Floros (2015)). The difference between unregistered PIPEs and registered direct (RD) PIPEs is that the latter are pre-registered and, thus, available for sale to retail investors immediately after placement. This enhances the liquidity of such shares.

The different issuance mechanisms present an equity capital raising landscape that is more complete than before the new regulations and particularly offers additional equity raising opportunities to smaller firms. Gustafson and Iliev (2017) note this increase in opportunities, and our evidence is complementary to theirs. We offer evidence in Panel A of Table 2.

Beginning with 2008 (the start of ATM activity), we present equity issuance statistics for the three major techniques. In both frequency and proceeds, ATM activity is clearly gaining in importance. From 2008 through 2016, announced ATM

TABLE 2
Comparison of ATMs, SEOs, and PIPEs

Table 2 presents the main characteristics of ATMs, SEOs, and PIPEs for the years 2008–2016. Panel A reports the distribution of completed transactions as well as the total gross proceeds amounts raised for all ATMs (excluding REITs and regulated industries). Information on the number of SEOs and PIPEs spans the same time period and again excludes REITs and regulated industries. The source for SEOs is the Securities Data Corporation (SDC) database. Our ATMs come from both The Deal's PrivateRaise (for the years 2011, 2012, 2013, 2014, 2015, and 2016) and hand collection (for the years 2008, 2009, and 2010). Our PIPEs come from The Deal's PrivateRaise. Panel B focuses on PIPEs. PIPEs include two different offering types: PIPEs offering unregistered stock and PIPEs offering registered stock (RDs). These two types of PIPEs have the following characteristics. PIPEs offering unregistered stock: These are placements involving equity and/or equity-linked securities under the Securities Act of 1933, as amended in Section 4(2). Unregistered stock PIPEs are not immediately resalable to the public upon transaction closing. PIPEs offering pre-registered stock (RDs): These are placements that involve the issuance of pre-registered equity and equity-linked securities (e.g., shelf sale) by an Issuer to an unlimited number of accredited Investors. RDs are immediately resalable to the public upon transaction closing.

Panel A. All ATMs, All SEOs, and All PIPEs

	All ATMs		All SEOs		Comparing ATMs and SEOs		All PIPEs		Comparing ATMs and PIPEs	
Year	#_OF_ ISSUES	PROCEEDS ($billions)	#_OF_ ISSUES	PROCEEDS ($billions)	#_OF_ ISSUES: ATM/SEO	PROCEEDS: ATM/SEO	#_OF_ ISSUES	PROCEEDS ($billions)	#_OF_ ISSUES: ATM/PIPE	PROCEEDS: ATM/PIPE
2008	8	0.49	76	30.74	10.5%	1.6%	1,167	26.11	0.7%	1.9%
2009	27	3.30	218	39.07	12.4%	8.4%	1,151	34.59	2.3%	9.5%
2010	47	1.50	234	34.76	20.1%	4.3%	1,372	24.95	3.4%	6.0%
2011	56	2.30	176	46.50	31.8%	4.9%	1,134	19.79	4.9%	11.6%
2012	62	5.25	212	43.76	29.2%	12.0%	1,030	33.48	6.0%	15.7%
2013	87	4.03	333	98.31	26.1%	4.1%	1,023	20.40	8.5%	19.8%
2014	97	10.06	329	84.02	29.5%	12.0%	1,085	32.22	8.9%	31.2%
2015	135	15.96	372	111.35	36.3%	14.3%	1,020	38.89	13.2%	41.0%
2016	163	19.53	256	75.59	63.7%	25.8%	1,132	48.19	14.4%	40.5%
All years	682	62.42	2,206	564.1	30.9%	11.1%	10,114	278.62	6.7%	22.4%

Panel B. All PIPEs, All Unregistered Stock PIPEs, and All Registered Stock PIPEs (RDs)

			Pipes by Stock Registration Status			
	All PIPEs		Unregistered Stock		RDs	
YEAR	#_OF_ ISSUES	PROCEEDS ($billions)	#_OF_ ISSUES	PROCEEDS ($billions)	#_OF_ ISSUES	PROCEEDS ($billions)
2008	1,167	26.11	1,067	23.02	100	3.09
2009	1,151	34.59	901	28.40	250	6.19
2010	1,372	24.95	1,114	19.28	258	5.67
2011	1,134	19.79	942	14.61	192	5.18
2012	1,030	33.48	825	26.68	205	6.80
2013	1,023	20.40	780	13.81	243	6.59
2014	1,085	32.22	866	26.62	219	5.60
2015	1,020	38.89	780	32.65	240	6.24
2016	1,132	48.19	856	40.39	276	7.80
All years	10,114	278.62	8,131	225.46	1,983	53.16

issuance programs (by nonregulated and nonfinancial firms) grew monotonically from 8 to 163 programs. Total proceeds grew from a mere $0.5 billion to nearly $20 billion during the same period.

SEO activity shows a rather different pattern over time. First, there is a dearth of SEOs in 2008 (due to the financial crisis). From 2009 through 2015, we see a general trend upward with some variability in SEO activity. Then we observe a clear reduction in activity in 2016. PIPE activity (again by nonregulated, nonfinancial firms) resembles the pattern of SEOs more than ATMs. The general trend is upward but with several different years of declines. Notably, though, 2016 sees a pronounced rise in PIPE use.

The three equity raising techniques combine to show a more consistent pattern of expansion in equity issuance over our sample period. Unreported analysis indicates a nearly monotonic rise in total equity issuance between 2008 and 2015.

There is a significant drop in total equity issuance by public firms in 2016, driven by much lower SEO activity. Overall, the data mostly support our inference of an expanding equity issuance landscape. Firms take advantage by raising more equity using all three techniques.

To better understand the role of ATMs in this expansion, we also present relative ATM (to SEO and PIPE) activity measures. Compared to SEO activity, both relative count and relative proceeds of ATM/SEO peak in 2016, with a pronounced rise over the last 3 years (2014–2016). The same pattern is evident for ATM activity relative to PIPE activity. These numbers strongly suggest the viability of ATMs as a permanent fixture in the U.S. equity issuance landscape.

Finally, in Panel B of Table 2, we show PIPE issuance activity classified by whether the issue was RD or not. There is a clear increase in the use of RD PIPE offerings after 2008, with both the number of issues and the proceeds essentially doubling. Given prior works' different sampling (on both time period and inclusion of RDs), this new information indicates greater expansion of equity issuance in the post-2008 era than previously thought.

IV. Ex Ante Characteristic Differences and Selection of ATM versus SEO Issuance

A. Descriptive Statistics

In addition to differences between the ATM and SEO issuance technique and growth, there are important firm characteristic differences between them. Table 3 presents and compares the ATM and SEO samples. We define all variables used in our analysis in the respective table legends. ATM firms are smaller (MARKET_VALUE_OF_EQUITY) than SEO firms, and they have lower leverage. They also expend more on R&D_TA_RATIO and show a higher TOBINS_Q while investing less via capital expenditures (CAPEX). ATM firms have lower SALES_TA_RATIO and lower EBITDA_TA_RATIO, correspondingly. They carry more cash relative to assets and burn it more quickly. They also need more external funds (when external funds needed (EFN) is negative, increases in CAPEX and net working capital are larger than earnings before interest, taxes, depreciation, and amortization (EBITDA)). Finally, despite lower apparent average FEES on ATMs than on SEOs, this is per dollar of announced proceeds. Accounting for ATMs' *actual* takedown implies higher fees per dollar of issuance on ATMs compared to SEOs. Note that these differences are likely attributable to variation in timing, industry clustering, and firm conditions.

In Section IV.B, we discuss our choice of proxies for the two key variables explaining ATM/SEO issuance technique choice, motivated by Chemmanur and Fulghieri (1994). Asymmetric information is proxied with ACCRUALS_QUALITY (aka opacity). ACCRUALS_QUALITY's construction (as the standard deviation of residuals from a regression explaining accruals) implies that *larger* values represent increases in asymmetric information. ATM firms have average ACCRUALS_QUALITY of 0.010, while SEO firms' average is 0.002, significantly smaller. The medians show a similar pattern. SEO firms have lower asymmetric information than ATM firms.

TABLE 3
Issuer Characteristics

Table 3 presents and compares the mean and the median values of annual financials and annual trading-related and recommendation-related information for all ATMs and SEOs in our sample. Transaction-specific information is also reported (FEES_AND_PROCEEDS_MVEQ_RATIO). Financial data (from Compustat Fundamentals Annual) are as of the fiscal year-end preceding the ATM announcement date or SEO issue date. MARKET_VALUE_OF_EQUITY is the product of shares outstanding and the closing price from 2 trading days prior to the ATM announcement or the SEO issuance date, expressed in $millions. LEVERAGE is the sum of short-term and long-term debt, all divided by total assets. R&D_TA_RATIO is R&D expenditures divided by total assets; if R&D is missing, we set it equal to 0. CASH_TA_RATIO is cash divided by total assets. SALES_TA_RATIO is revenues divided by total assets. CASH_BURN is the absolute value of operating income before depreciation divided by the sum of cash and cash equivalents; when the income number is positive, cash burn is set equal to 0. This follows Chaplinsky and Haushalter (2010). EBITDA_TA_RATIO is EBITDA divided by total assets. TOBINS_Q is the book value of total assets minus the book value of equity plus the market value of equity, all divided by the book value of assets. EFN_TA_RATIO is external financing needs and equals EBITDA minus change in CAPEX minus change in net working capital, all divided by total assets. CAPEX_TA_RATIO is capital expenditures divided by total assets. TOTAL_INSTITUTIONAL_HOLDINGS is the fraction of total shares outstanding owned by institutions taken from 13F filings. PROCEEDS_MVEQ_RATIO is the ATM (or SEO) proceeds divided by the market value of equity (computed on the event day). FEES is the gross spread over proceeds for SEOs, and it is agent cash fees over planned proceeds for ATMs. ANALYST_RECOMMENDATIONS is the firm's cross-analyst average of future consensus analyst recommendations. The consensus analyst recommendation comes from Thomson Reuters the quarter following the ATM announcement quarter or SEO issuance quarter. The analyst recommendations scale is as follows: "strong buy" = 1, "buy" = 2, "hold" = 3, "underperform" = 4, and "sell" = 5. ANALYST_REVISIONS is the firm's (cross-analyst) average of the difference between future and lagged consensus analyst recommendations. ACCRUALS_QUALITY is the standard deviation of residuals from the estimation model explaining total current accruals with lagged, contemporaneous, and lead cash flows from operations as well as the change in sales and property, plant, and equipment. RUN_UP is the stock's daily cumulative market-adjusted return over the window $[-252, -3]$. TURNOVER is the trading volume divided by shares outstanding, per day (averaged over trading days -25 to -3, where the ATM announcement date or SEO issue date is trading day 0). STOCK_RETURN_VOLATILITY is the annualized standard deviation of daily stock returns over the prior trading year, specifically $[-252, -2]$, where day 0 is the announcement date of the ATM program or issuance date of the SEO. Trading-related and recommendations-related information is drawn from various sources: PROCEEDS and FEES (ATMs) from PrivateRaise; TURNOVER, MVEQ, and STOCK_RETURN_VOLATILITY from CRSP; FEES (SEOs) from SDC; and ANALYST_RECOMMENDATIONS and ANALYST_REVISIONS from the Institutional Brokers' Estimate System.

	ATMs				SEOs			
Variable	Mean	Median	Std. Dev.	No. of Obs.	Mean	Median	Std. Dev.	No. of Obs.
MARKET_VALUE_OF_EQUITY ($b)	1.52	0.18	6.78	444	2.94	0.85	12.41	1,550
LEVERAGE	0.39	0.34	0.31	439	0.48	0.45	0.34	1,565
R&D_TA_RATIO	0.42	0.3	0.68	414	0.18	0.07	0.37	1,463
CASH_TA_RATIO	0.50	0.56	0.36	446	0.29	0.11	0.33	1,634
SALES_TA_RATIO	0.35	0.16	0.50	446	0.7	0.50	0.76	1,631
CASH_BURN	0.81	0.42	2.25	442	0.41	0.00	2.30	1,630
EBITDA_TA_RATIO	−0.40	−0.28	0.75	445	−0.04	0.09	0.46	1,626
TOBINS_Q	3.46	2.38	4.63	442	2.96	1.87	3.5	1,525
EFN_TA_RATIO	−0.45	−0.3	0.64	432	−0.13	0.05	0.47	1,534
CAPEX_TA_RATIO	0.05	0.01	0.09	442	0.07	0.03	0.11	1,628
TOTAL_INSTITUTIONAL_HOLDINGS	0.34	0.3	0.26	390	0.60	0.64	0.3	1,567
PROCEEDS_MVEQ_RATIO	0.20	0.15	0.20	423	0.18	0.11	0.55	1,251
FEES	2.94	3.00	0.01	460	4.53	4.75	0.02	1,201
ANALYST_RECOMMENDATIONS	2.45	2.50	0.61	394	2.03	2.00	0.45	1,658
ANALYST_REVISIONS	0.44	0.27	0.72	368	0.06	0.02	0.51	1,658
ACCRUALS_QUALITY	0.01	0.007	0.05	402	0.002	0.0008	0.04	1,483
RUN_UP	0.02	0.03	1.63	448	0.21	0.13	1.12	1,741
TURNOVER	0.02	0.008	0.04	448	0.01	0.008	0.03	1,744
STOCK_RETURN_VOLATILITY	0.67	0.56	0.44	449	0.53	0.43	0.60	1,743

Our proxy for (ex ante) unobservable firm quality is future analyst recommendations (ANALYST_RECOMMENDATIONS) and changes in them from before to after the event. The coding of ANALYST_RECOMMENDATIONS is 1 to 5 for strongest to weakest (strong buy to strong sell), respectively. The average recommendation value (across analysts) for SEOs in our sample (2.03) is more bullish than for ATMs (2.45), implying SEOs associate with higher quality firms than ATMs do. The same is true when we compare cross-analyst averages of changes in recommendations (ATMs equal 0.44, while SEOs equal 0.06).

We also require TOTAL_INSTITUTIONAL_HOLDINGS to control for the potential influence of share demand elasticity on issuance method choice

(Gao and Ritter (2010)). Our institutional holdings data are from 13F quarterly filings and are collected for the quarter prior to the announcement (of either ATM or SEO). Both mean and median values of TOTAL_INSTITUTIONAL_HOLDINGS among ATM firms are significantly lower than among SEO firms. As we discuss subsequently in our results, the dribble-out nature of ATMs potentially reduces the need for strong institutional demand for shares.

Since ATMs involve secondary market issuance, we also examine trading-related variables. We focus on factors that are likely to correlate with the optionality in dribble-out (takedown) amount and flexible timing of ATMs, particularly those that proxy for existing secondary market demand. TURNOVER is similar in the median across the two samples, while mean TURNOVER is slightly higher for ATMs, loosely consistent with some practitioners' views that ATMs offer a liquidity-timing option to issuing firms (whenever they deem that liquidity is favorable). STOCK_RETURN_VOLATILITY is higher before ATMs than SEOs, also consistent with ATMs being used potentially to exploit timing options.

B. The Choice between ATM and SEO

Given the clear differences in the characteristics of ATM and SEO users, particularly suggesting that ATM users are more opaque and of lower quality than SEO users, we explore their influence on firm choice of issuance technique. We specifically test Chemmanur and Fulghieri's (1994) implication that firms prefer underwritten equity issuance unless it is too costly. Underwriter certification is most expensive when there is asymmetric information about firm quality, and an investment bank's certification of high quality is likely to have negative reputation repercussions (i.e., when the bank perceives that the firm is likely to be of lower quality). Chemmanur and Fulghieri (1994) predict that the likelihood of an equity offering being underwritten increases in the interaction between asymmetric information and unobserved issuer quality.

We test the joint influence of asymmetric information and (unobserved) firm quality using a logit regression. The dependent variable equals 1 if the firm conducts an ATM and 0 if an SEO. Our general specification is as follows:

$$(1)\quad y = \alpha + \delta \times X + \beta_1 \times \mathrm{AI} + \beta_2 \times \mathrm{QUALITY} + \beta_3 \times \mathrm{AI} \times \mathrm{QUALITY} + \varepsilon,$$

where X is a matrix of control variables, AI is the proxy for asymmetric information, and QUALITY is the proxy for unobserved firm quality (that the underwriter certifies in an SEO). The key coefficient is β_3. Since the product of AI and QUALITY is more positive among firms that both are higher quality and have higher asymmetric information (who are expected to use an underwriter), we expect $\beta_3 < 0$.

We follow Lee and Masulis (2009) (who use the modified Dechow and Dichev (2002) model as applied in Francis, Lafond, Olsson, and Schipper (2005)) and measure asymmetric information between insiders and outsiders with accrual quality (aka opacity). These papers argue that opacity measures the difference between the information set of outside investors who rely on financial reporting information and that of insiders who do not have to rely on financial reporting. Lee and Masulis (2009) show that both SEO announcement returns decrease and gross spreads charged by underwriters increase in opacity. Billett and Yu (2016)

show that stock price reactions to open-market share repurchases increase in this measure.

For unobserved firm quality, we use future analyst recommendations and future changes in recommendations. Underwriter certification is valuable in Chemmanur and Fulghieri's (1994) model when it clarifies firm quality to asymmetrically informed investors. More bullish recommendations indicate higher expected value than currently available, and the ex post version is unobserved at the time of issuance. Because Table 3 indicates a high standard deviation relative to the average recommendation, we use a dummy variable for our proxy. The dummy equals 1 if the firm's future consensus analyst recommendation is more bullish (than the sample median recommendation value), and 0 otherwise. A parallel approach is used when recommendation changes proxy unobserved firm quality.

We present our logit estimates in the first two columns of Table 4. The models only differ by their proxy for firm quality. In model 1), we use the dummy

TABLE 4

Logistic and Linear Probability Regressions Explaining ATM versus SEO Events

Models 1 and 2 in Table 4 report log odds estimates from logistic regressions explaining the incidence of ATM or SEO where the dependent variable equals 1 for an ATM and 0 for an SEO. Models 3 and 4 report the marginal effects from LPM regressions where the dependent variable equals 1 for an ATM and 0 for an SEO. ANALYST_RECOMMENDATIONS_DUMMY is equal to 1 if the firm's future consensus analyst recommendation is lower than the sample median value, and 0 otherwise. The consensus (average) analyst recommendation comes from Thomson Reuters the quarter following the ATM announcement quarter or SEO issuance quarter. ANALYST_REVISIONS_DUMMY is equal to 1 if the firm's difference between future and lagged consensus analyst recommendations is lower than the sample median value, and 0 otherwise. The consensus (average) analyst recommendation comes from Thomson Reuters the quarter following as well as the quarter preceding the ATM announcement or SEO issuance quarter. ACCRUALS_QUALITY is the standard deviation of residuals from the estimation model explaining total current accruals with lagged, contemporaneous, and lead cash flows from operations as well as change in sales and property, plant, and equipment. We also include the interaction variables ANALYST_RECOMMENDATIONS_DUMMY_ACCRUALS_QUALITY_INT and ANALYST_REVISIONS_DUMMY_ACCRUALS_QUALITY_INT. ln(MARKET_VALUE_OF_EQUITY) is the natural logarithm of the market value of equity. R&D_TA_RATIO is R&D expenditures divided by total assets. If R&D is missing, we set it equal to 0. CAPEX_TA_RATIO is capital expenditures divided by total assets. TOBINS_Q is the book value of total assets minus the book value of equity plus the market value of equity, all divided by the book value of assets. TURNOVER is trading volume divided by shares outstanding, per day (averaged over trading days −25 and −3 when the ATM announcement date or SEO issue date is trading day 0). STOCK_RETURN_VOLATILITY is the annualized standard deviation of daily stock returns over prior trading year, specifically [−252, −2], where day 0 is the announcement date of the ATM program or issuance date of the SEO. PROCEEDS_MVEQ_RATIO is the ATM/SEO proceeds divided by the market value of equity (computed on the event day). RUN_UP is the stock's daily cumulative market-adjusted return over the window [−252, −3]. EFN_TA_RATIO is external financing needs and equals EBITDA minus change in CAPEX minus change in net working capital. SALES_TA_RATIO is revenues divided by total assets. LEVERAGE is the sum of short-term and long-term debt divided by total assets. EBITDA_TA_RATIO is EBITDA divided by total assets. CASH_TA_RATIO is cash and equivalents all divided by total assets. TOTAL_INSTITUTIONAL_HOLDINGS is the fraction of total shares outstanding owned by institutions taken from 13F filings. Institutional holdings are available from Thomson Reuters and are reported on a quarterly basis. We use analyst recommendations and analyst revisions as a proxy for firm's quality and accruals quality as a proxy for information asymmetry. The LPMs 3 and 4 contain industry fixed effects defined by Fama–French 49 industry classifications. *p*-values are reported below the coefficients, in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	1	2	3	4
Intercept	7.07***	7.26***	0.88***	0.83***
	(0.000)	(0.000)	(0.000)	(0.000)
ANALYST_RECOMMENDATIONS_DUMMY	1.64***		0.10***	
	(0.000)		(0.006)	
ACCRUALS_QUALITY	4.88**	1.91***	0.42***	0.63***
	(0.018)	(0.006)	(0.001)	(0.001)
ANALYST_RECOMMENDATIONS_ DUMMY _ACCRUALS_QUALITY_INT	−1.17***		−0.46***	
	(0.001)		(0.000)	
ANALYST_REVISIONS_DUMMY		0.63**		0.04**
		(0.003)		(0.03)
ANALYST_REVISIONS_DUMMY_ ACCRUALS_QUALITY_INT		−1.14**		−0.80**
		(0.024)		(0.011)

(continued on next page)

TABLE 4 (continued)
Logistic and Linear Probability Regressions Explaining ATM versus SEO Events

	1	2	3	4
ln(MARKET_VALUE_OF_EQUITY)	−1.09***	−1.06**	−0.07***	−0.06***
	(0.000)	(0.000)	(0.000)	(0.000)
R&D_TA_RATIO	−0.56	−1.11	−0.25***	−0.28***
	(0.550)	(0.179)	(0.000)	(0.000)
CAPEX_TA_RATIO	−7.14*	−7.10**	−0.30**	−0.34***
	(0.055)	(0.025)	(0.014)	(0.006)
TOBINS_Q	−0.35***	−0.37***	−0.03***	−0.03***
	(0.000)	(0.000)	(0.000)	(0.000)
TURNOVER	−7.16	−10.97	−0.72	−0.44
	(0.408)	(0.145)	(0.212)	(0.447)
STOCK_RETURN_VOLATILITY	−0.47	0.18	−0.01	−0.01
	(0.555)	(0.747)	(0.785)	(0.701)
PROCEEDS_MVEQ_RATIO	−2.92***	−3.11***	−0.05**	−0.06**
	(0.004)	(0.003)	(0.036)	(0.015)
RUN_UP	−0.20**	−0.21*	−0.03***	−0.04***
	(0.060)	(0.082)	(0.002)	(0.001)
EFN_TA_RATIO	−0.22	−0.08	−0.06	−0.05
	(0.684)	(0.870)	(0.169)	(0.293)
SALES_TA_RATIO	−0.46	−0.27	−0.02	−0.02
	(0.184)	(0.372)	(0.298)	(0.309)
LEVERAGE	0.70	0.61	0.06	0.05
	(0.136)	(0.192)	(0.138)	(0.205)
EBITDA_TA_RATIO	−2.53***	−3.07***	−0.30***	−0.34***
	(0.002)	(0.000)	(0.000)	(0.000)
CASH_TA_RATIO	0.24	−0.07	0.10*	0.11*
	(0.768)	(0.927)	(0.078)	(0.060)
TOTAL_INSTITUTIONAL_HOLDINGS	−1.88***	−2.62***	−0.24***	−0.27***
	(0.006)	(0.000)	(0.000)	(0.000)
Industry fixed effects	No	No	Yes	Yes
−2 log likelihood (models 1 and 2) and *F*-value (models 3 and 4)	733.67	733.98	35.17	33.11
Max-rescaled R^2 (models 1 and 2) and adj. R^2 (models 3 and 4)	0.68	0.66	0.43	0.42
No. of obs.	769	769	769	769

based strictly on ex post analyst recommendation, while model 2) uses the change in analyst recommendation dummy. The latter two columns in Table 4 offer corresponding estimations using a linear probability model (LPM). This facilitates economic interpretation of factors influencing issuance technique. The LPM models also allow for inclusion of industry fixed effects that help control for systematic differences in, for example, opacity across industries.

The logit results support the prediction of Chemmanur and Fulghieri (1994) that higher asymmetric information along with higher firm quality increases the likelihood of an SEO instead of an ATM. The coefficient on the interactive of accrual quality and the firm quality dummy is significantly negative (recall that SEOs carry a lower dependent variable value) in both specifications.[6] To ascertain the economic effect of the interactive variable, we use the LPM (in columns 3 and 4). The simplest interpretation is to consider conditioning on higher quality firms (dummy = 1). In this case, the coefficient on the interactive variable

[6]The Supplementary Material (using the methodology of Ai and Norton (2003)) confirms the negative coefficient on the logistic regressions' interaction term of firm quality with asymmetric information.

(−0.46 in column 3 of Table 4) may be interpreted as follows. For high-quality firms, a 1-standard-deviation increase in opacity (0.05) associates with a 2.3% increase in the probability of a firm choosing to issue via an SEO instead of an ATM. Given the relative number of occurrences of ATMs to SEOs in our sample of 30.9%, the 2.3% increase amounts to 7.4% of the sample average probability. When we proxy firm quality with changes in recommendation that exceed the median (column 4), the coefficient on the interactive (−0.80) term implies that a 1-standard-deviation increase in opacity (0.05) associates with a 4.0% increase in the probability of an SEO.

A potential concern with the results from the LPM with industry fixed effects is that some industries have only one firm conducting an ATM and are, thus, dropped from the analysis. We assess the robustness of our results by removing the industry dummies and include all ATMs in the model (untabulated but available by request). The coefficients on the interactives in specifications mirroring columns 3 and 4 are remarkably similar to the reported ones. Asymmetric information combined with high firm quality robustly correlates with SEO choice (over ATM).

Returning to the logits, a few control variables are significant and noteworthy. We see a negative coefficient on TOBINS_Q, suggesting that more growth opportunities encourage an SEO as opposed to an ATM. Firms with more growth opportunities may need more capital in general. Indeed, the negative and significant coefficients on PROCEEDS_MVEQ_RATIO and CAPEX_TA_RATIO suggest this. We also see that SEO choice is more likely when EBITDA_TA_RATIO is higher in the prior year. Larger RUN_UP associates with greater likelihood of an SEO as opposed to ATM, consistent with the extant SEO literature, which documents strong average stock performance before equity issuances.

ATMs are also more likely to be chosen over SEOs when institutional ownership is ex ante lower. Gao and Ritter (2010) argue that low institutional ownership weakens short-run elasticity of demand for shares. Large placements of shares (SEOs) incur significant price discounts in such cases unless marketing flattens the short-run demand curve, thus encouraging fully marketed SEOs. However, we observe the opposite, raising the question of why. The advantage of ATMs when institutional ownership is low is the opportunity to issue smaller share quantities several times over a longer time span, moving along the *long-run* demand curve. This allows the firm to potentially take advantage of greater demand elasticity at each step. Put differently, a firm issuing shares amounting to 20% of outstanding shares is likely to face greater discounting or market impact than a firm issuing 5% of shares outstanding at four widely spaced intervals.

V. Actual Issuance Behavior in ATM Programs

Given ATMs' flexibility to be executed in a dribble-out fashion, we investigate firms' actual issuance behavior under their ATM programs. Firms report their issuance of equity under the ATM program on their 10-Q (or 10-K in the case of the fiscal year-end) filing. The 10-Q provides only aggregated (across all the firm's issues in the quarter) information on actual issuance activity. The sample comprises ATMs that we are also able to find price data for (from the Center

for Research in Security Prices (CRSP), and we only hand collected the takedown information through Dec. 2015.

A. Univariate Statistics

We focus on two firm-level measures of actual issuance activity. FRACTION_OF_ANNOUNCED_ISSUANCE equals the total number of shares actually issued during the ATM program, divided by the announced number of shares that the firm planned to issue under the ATM program. COMPLETION_DURATION is conditional on a firm completing full issuance of the announced number of shares under the ATM and equals the number of quarters it took the firm to do so. For this variable, even if a firm did not issue shares during a particular quarter during its ATM program, we count that quarter as long as it occurs before the ATM is completed.

We also present two measures of "price efficiency" of firm takedown. We scale the firm's reported "weighted average actual issuance price"[7] by two different measures of market price: the end-of-quarter price and the quarter's average (time-series) price (using daily closing prices). The former measure may be viewed as the benefit of doing an ATM relative to an SEO executed strictly on the last day of the quarter. While not all firms would choose to do an SEO at the end of the quarter, it is one possible view of the snapshot that would occur on any particular day of the quarter. The latter measure may be viewed as the benefit/cost of picking various days/times to dribble out (perhaps on the basis of firm expectations that it is a favorable moment), relative to a rather uninformed approach of dribbling out an equal amount each day of the quarter. This latter methodology mirrors recent work in the stock repurchase literature (Bonaimé, Hankins, and Jordan (2016), Dittmar and Field (2015)). Both papers report that the average price paid during a buyback exceeds the average stock price smoothed over the repurchase window.

Table 5 presents means, medians, and standard deviations of the preceding variables across various samples. For the full sample of firms (in Panel A), average actual issuance is slightly less than half of the announced plan size (43% in the mean), while the median firm issues just over one quarter (27%). There is substantial variation in execution across firms (42% standard deviation). The typical firm does not issue the full amount of announced ATM planned shares and often takes down substantially less than even half the announced amount. Confirming evidence is seen in the roughly one-third ratio of firms (191 out of 515) taking down the full planned/announced amount. Also, in Panel A, we see that the cross-sectional mean WEIGHTED_AVERAGE_ISSUE_PRICE_ENDOFQUARTER_PRICE_RATIO is 1.37 and the median is 1.02. The final row of Panel A compares the average firm issuance price to the average daily stock price during the quarter. The mean (median) of this ratio equals 1.64 (1.02).[8]

[7]This is a weighted average of the daily prices at which shares were issued (across all dribble-outs that quarter) with weighting by number of shares issued at each day's price.

[8]While the *mean* values of pricing efficiency may seem large, they possess equal weight across all observations. If we value weight according to the market cap of each firm at the previous quarter-end, the results indicate between 5% and 6% premia of average takedown price relative to quarter-end or average quarterly price.

TABLE 5
Univariate Statistics on Firm Dribble-Out Behavior (of ATM Shares)

Table 5 presents univariate statistics on firms' actual issuance behavior of ATM offerings. Panel A presents summary statistics for all ATM issuers, and Panel B (Panel C) presents all ATM issuers that belong to the ATMs that exhibit greater (lower) than the ATM sample median inflation-adjusted sales. Data come from firms' 10-Q filings (for the ending quarter of each fiscal year, we use the 10-K filing). FRACTION_OF_ANNOUNCED_ISSUANCE is the fraction of the announced equity that was actually taken down. COMPLETION_DURATION is the number of quarters that it took the ATM issuer to take down all shares announced in the ATM program. We report two different weighted average market prices based on actual issuance activity reported by ATM issuers. The first (WEIGHTED_AVERAGE_ISSUE_PRICE_ENDOFQUARTER_PRICE_RATIO) is the average market price ATM issuers receive divided by the end-of-quarter closing price. The second (WEIGHTED_AVERAGE_ISSUE_PRICE_QUARTERAVERAGECLOSING_PRICE_RATIO) is the average market price ATM issuers receive divided by the average contemporaneous quarter's closing price. For these measures, we only consider the ATM issuances for which we have the weighted average market price documented in the issuer's 10-Q or 10-K. The Annual Consumer Price Index comes from the Federal Reserve Bank of Minneapolis Web site (https://www.minneapolisfed.org/community/financial-and-economic-education/cpi-calculator-information/consumer-price-index-and-inflation-rates-1913), and all sales are adjusted for inflation using the year 2008 as the basis.

	Mean	Median	Std. Dev.	*N*
Panel A. All Firms				
FRACTION_OF_ANNOUNCED_ISSUANCE	0.43	0.27	0.42	515
COMPLETION_DURATION (completed only)	6.21	6.00	3.36	191
WEIGHTED_AVERAGE_ISSUE_PRICE_ENDOFQUARTER_PRICE_RATIO	1.37	1.02	4.39	998
WEIGHTED_AVERAGE_ISSUE_PRICE_QUARTERAVERAGECLOSING_PRICE_RATIO	1.64	1.02	7.74	762
Panel B. Greater than Median Inflation-Adjusted Sales Firms				
FRACTION_OF_ANNOUNCED_ISSUANCE	0.48	0.34	0.44	258
COMPLETION_DURATION (completed only)	6.74	7.00	3.48	96
WEIGHTED_AVERAGE_ISSUE_PRICE_ENDOFQUARTER_PRICE_RATIO	1.42	1.01	2.14	499
WEIGHTED_AVERAGE_ISSUE_PRICE_QUARTERAVERAGECLOSING_PRICE_RATIO	1.69	1.00	2.23	381
Panel C. Lower than Median Inflation-Adjusted Sales Firms				
FRACTION_OF_ANNOUNCED_ISSUANCE	0.33	0.13	0.39	257
COMPLETION_DURATION (completed only)	5.85	6.00	3.17	95
WEIGHTED_AVERAGE_ISSUE_PRICE_ENDOFQUARTER_PRICE_RATIO	1.28	1.04	1.14	499
WEIGHTED_AVERAGE_ISSUE_PRICE_QUARTERAVERAGECLOSING_PRICE_RATIO	1.58	1.04	1.41	381

How should we interpret these relative price patterns and (lack of) completion behavior? One plausible explanation is that firms follow a mechanical rule: issue shares until a price drop and then stop. If stock price rises again, the firm reengages in issuance. Such behavior yields average issue prices that exceed average quarter prices and also the end-of-quarter price. It also potentially explains failure to complete the issuance of all ATM-announced shares. However, it is important to note that none of this necessarily implies managers have market timing ability; prediction of future price patterns is not necessary under this mechanical rule.

Staged investment patterns may also explain the price patterns and lack of complete takedown. If the size of the announced ATM program is an upper bound on the firm's expected future financing needs, then as the investment unfolds, and more is learned about the opportunity, the firm either continues to invest and expand or curtails investment. This could lead to uncompleted programs if market feedback is negative, which would likely be accompanied by lower returns in the final quarter of takedown.

Finally, untabulated results indicate that firms that do not complete takedown show worse stock performance in the final quarter of takedown activity but

rarely are acquired or dropped from the exchange. Perhaps the most surprising implication of our results is that we do not see mirror images of mechanical behavior in average firm repurchasing.

Panels B and C of Table 5 split our full sample based on whether the firm has above or below median inflation-adjusted sales. The key difference in takedown behavior between firms in the higher and lower sales groups is cumulative execution. Firms with sales greater than the sample median take down a larger percentage of the announced plan (48% vs. 43% for the means and 34% vs. 13% for the medians). However, this does not imply an obvious difference in actual completion ratios (37% of firms in each sub-sample completely issue announced takedown). The time to completion is slightly longer for firms with greater sales but only by 1 calendar quarter, and while average measures of price efficiency are "better" among larger sales firms, the medians are not. While it is difficult to draw firm conclusions, the evidence is consistent with larger sales firms being more likely to take advantage of the optionality in ATM issues.

B. Censored Quantile Regressions

Numerous factors may influence firms' preferences to execute actual issuances in ATM programs. In Table 6, we investigate the effects of time, stock volatility, and stock returns on dribble-out activity. The regressions treat each quarter of potential actual issuance by a firm as a separate observation, resulting in 1,436 firm/quarter observations (despite only 515 firms with actual issuance information). While this suggests a small average number of quarters per firm, recall that a large number of ATM programs were announced in 2014 and 2015. Since we only collect dribble-out data through Dec. 31, 2015, many of our observations will have limited data available. We also stop collecting dribble-out information upon completion of a firm's ATM program, and we require sufficient data to calculate our regressors.

We use censored quantile regression (CQR) because of the highly censored nature of actual issuance activity (fully 59.9% of our firm/quarters have zero dribble-out executed).[9] Put differently, since ordinary least squares minimizes the sum of squared deviations from the mean, significant mass of the distribution at 1 tail (0 in our case since many firm-quarters show zero takedown) can unduly influence coefficients. We would learn less about factors that influence variation of takedown conditional on issuance and more about the decision to take down or not (which was explored in the prior section). We estimate the CQR centering our analysis on the 80th, 85th, and 90th quantiles. Varying the center point around these higher percentiles provides roughly similar numbers of observations on either side of the centering quantile. It also increases the efficiency of our estimates in the minimization of sum of squared errors.

Our results indicate that the following factors correlate significantly with firms' actual issuance: the number of quarters since ATM announcement (QUARTER_COUNTER), the firm's stock return during the quarter (CURRENT_QUARTER_BHARS), and the cumulative amount of takedown in

[9] A Tobit regression also handles censored data; however, our data on actual takedown fail to satisfy the normality and homoscedasticity assumptions of the Tobit.

TABLE 6
Regressions Explaining Dribble-Out Behavior

Table 6 presents estimates from CQRs of the actual cumulative issuance (the total number of shares issued from the start of the program through this quarter, relative to the number of shares the firm announced it planned to issue in the original filing) on a set of explanatory variables. QUARTER_COUNTER is the number of quarters since the ATM announcement. STOCK_RETURN_VOLATILITY is the contemporaneous quarter's standard deviation of daily stock returns. PRIOR_QUARTER_BHARS is the buy-and-hold abnormal returns minus the return of the CRSP value-weighted index including dividends over the quarter preceding the actual cumulative issuance measure's quarter. CURRENT_QUARTER_BHARS is the buy-and-hold abnormal returns minus the CRSP value-weighted return index including dividends over the quarter of the actual cumulative issuance measure's quarter. COMMITMENT_DUMMY is equal to 1 if the firm announces a commitment period for issuance (rather than allowing it to expire at the end of the 3-year shelf registration period), and 0 otherwise. PRIOR_CUMULATIVE_TAKEDOWN_FRACTION is the total fraction of shares taken down over the announced total, across all preceding quarters of the ATM program. The sample is all firm/quarters (1,436) with sufficient data to run the regression. In separate models, we focus on the following quantiles of the fraction of actual issuance: 80th (Q80), 85th (Q85), and 90th (Q90). *p*-values are reported below the coefficients, in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. For each ATM program, the actual issuance activity is computed up to Dec. 31, 2015.

	Parameter Estimates		
	Q80	Q85	Q90
Parameters	1	2	3
Intercept	0.16***	0.20***	0.26***
	(0.000)	(0.000)	(0.000)
QUARTER_COUNTER	−0.01***	−0.02***	−0.02***
	(0.000)	(0.003)	(0.000)
STOCK_RETURN_VOLATILITY	0.01	0.04**	0.06**
	(0.423)	(0.049)	(0.037)
PRIOR_QUARTER_BHARS	0.06	0.07	0.11
	(0.297)	(0.193)	(0.147)
CURRENT_QUARTER_BHARS	0.12***	0.20***	0.23***
	(0.000)	(0.000)	(0.000)
COMMITMENT_DUMMY	0.01	0.01	0.02
	(0.631)	(0.735)	(0.362)
PRIOR_CUMULATIVE_TAKEDOWN_FRACTION	0.04***	0.06***	0.07***
	(0.000)	(0.000)	(0.000)
Predicted mean value of dependent variable	0.176	0.257	0.388
No. of firm/quarters	1,436		

prior quarters (PRIOR_CUMULATIVE_TAKEDOWN_FRACTION). Firms take down less in later quarters, consistent with fewer shares remaining on the shelf. However, controlling for time elapsed, greater past takedown implies more current-quarter takedown. Finally, greater dribble-out during quarters of higher (abnormal) stock returns is consistent with firms potentially following the earlier mentioned mechanical rule.

C. Cash Savings Behavior Out of ATMs and SEOs

Given ATMs' flexibility in issuance timing, firms may view them as a substitute for alternative flexible financing. Huang and Ritter (2017) report that net debt issuers spend 86 cents of every new dollar raised. To the extent that a meaningful proportion of net debt issuance is bank debt, this is consistent with viewing bank loans (usually takedowns of revolving credit lines) as a more continuous form of financing. We may interpret ATMs similarly, especially in comparison to SEOs, which raise lumpy quantities of equity (much like public debt issues). This raises the question of whether firms will tend to spend a greater proportion of ATM issuance proceeds immediately relative to that seen among SEOs.

Table 7 tests this using cash savings regressions following McLean (2011). The dependent variable is the change in cash (quarterly). The regressors are stock issue proceeds (STOCK_ISSUE), debt issue proceeds (DEBT_ISSUE),

TABLE 7

Regressions of Change in Cash on Source(s) of Cash
(Cash Savings Behavior Out of ATMs and SEOs)

Table 7 presents the linear regression estimates explaining the difference between cash at the end of the year t and cash at the end of the year $t-1$. Sources of cash (i.e., stock issue, debt issue, cash flow, and other sources) are measured as of year t and are scaled by lagged total assets. Following McLean (2011), STOCK_ISSUE is cash proceeds from share issuance. DEBT_ISSUE is cash proceeds from debt issuances, and CASH_FLOW is cash flow from operations. OTHER_SOURCES is all other cash sources, which includes the sales of assets and investments. TOTAL_ASSETS equals the total book value of assets. All are measured as of year t. There are two estimation models presented, one for ATMs and one for SEOs. Standard errors are clustered at the firm level. p-values are reported in parentheses below the coefficients. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Parameter Estimates	
	ATMs	SEOs
Parameters	1	2
Intercept	−0.04	−0.14***
	(0.183)	(0.000)
STOCK_ISSUE	0.65***	0.84***
	(0.000)	(0.000)
DEBT_ISSUE	0.61***	0.10
	(0.000)	(0.104)
CASH_FLOW	−0.40	−0.47**
	(0.145)	(0.015)
OTHER_SOURCES	0.11	0.02
	(0.257)	(0.749)
TOTAL_ASSETS	−0.00	0.00*
	(0.637)	(0.059)
R^2	0.229	0.821
No. of firm/quarters	1,394	966
No. of clusters (firm level)	347	651

CASH_FLOW, and other sources of cash (OTHER_SOURCES), all scaled by lagged total assets, and a control variable of TOTAL_ASSETS. We run the regression on two separate samples: ATM events over the 8 quarters following (because 2 years out is when most takedown has occurred) and SEO events over 1 quarter from the pre-event quarter-end to the post-event quarter-end. These are panel regressions with Rogers' standard errors (see Petersen (2009)).

Across the two regressions, we see a majority of equity issuance proceeds saved. For ATMs, the coefficient on STOCK_ISSUE is 0.65, while for SEOs, the coefficient is 0.84. The latter is significantly higher, indicating a greater propensity of firms to immediately spend ATM proceeds compared to SEO proceeds. An F-test confirms statistical significance of this difference. Economically, the difference is also important. A 65% savings rate for the average ATM announcement ($92 million) combined with an average takedown of 43% implies a $26 million cash savings. The same calculation implies that $215 million of average firm SEO proceeds are saved. Firms issuing equity via SEO appear to hoard a greater proportion of the proceeds than firms issuing equity via ATM, consistent with the more continuous nature of ATM financing.

The coefficients on the control variables are "in the neighborhood" of McLean's (2011) for SEOs.[10] Notably, though, the coefficient on debt issue

[10]While our coefficients may be somewhat larger than McLean's (2011), we have a later sample period and we focus on just SEOs in the second specification. McLean also includes private placements, rights offerings, stock sales through direct purchase plans, preferred stock issues, conversions of debt and preferred stock and employee options, grants, and benefit plans.

proceeds is quite different for ATM firms than for SEO firms. This, too, may reflect the more continuous nature of ATM financing, encouraging less spending of net debt issuances. ATMs may substitute for other forms of continuous financing.

VI. Conclusions

We study the anatomy of a new approach to offering equity. ATM offerings came into fashion starting in 2008, driven by regulatory changes that made such offerings feasible. Over our sample period (2008–2016), there were 31% as many ATM issuance programs as there were SEOs, with the percentage growing over time. ATMs comprise a meaningful portion of the follow-on equity issuance market.

ATM firms' ex ante characteristics differ from those of SEO firms. They tend to be smaller with higher growth opportunities but less profitability, with a notable concentration among money-losing biotech companies (see the Supplementary Material for details). ATM firms also have lower leverage and carry more cash. In short, they have the markings of greater asymmetric information problems. This implies potential benefits to the certification associated with using an underwriter, but also potential costs in doing so. Theory by Chemmanur and Fulghieri (1994) predicts that higher asymmetric information encourages underwriting, instead of direct placement of equity as in ATMs, when the bank's potential reputational costs of doing so are small (in other words, among higher quality firms). We document that SEOs are more likely among higher asymmetric information firms when they are also of higher quality.

We explore firms' actual issuance behavior in their ATM programs. The data are consistent with firms following a mechanical rule of issuing when the stock price is rising and not doing so in the face of falling prices. Moreover, these results are consistent with patterns resulting from staged investments. Further exploration of this issue would require more precise information on the daily issuance activity under ATM programs. Currently, such data are not available.

Many avenues for future research remain. For example, given that underwritten offers are aimed at institutions, prior work on SEOs largely ignores retail investor considerations. Given our results that ATMs are more likely when institutional demand for shares is lower, ATMs may rely more on retail demand for shares. Another potential area of exploration with ATMs is the capital structure literature on partial adjustment toward a target. ATMs offer another avenue for leverage reduction that may optimally involve timing options. Overall, our conclusion that ATMs are a permanent fixture in the equity issuance landscape augurs new opportunities for research in the corporate financing arena.

Supplementary Material

Supplementary Material for this article is available at https://doi.org/10.1017/S0022109018000893.

References

Ai, C., and E. C. Norton. "Interaction Terms in Logit and Probit Models." *Economics Letters*, 80 (2003), 123–129.

Billett, M. T.; R. Elkamhi; and I. V. Floros. "The Influence of Investor Identity and Contract Terms on Firm Value: Evidence from PIPEs." *Journal of Financial Intermediation*, 24 (2015), 564–589.

Billett, M. T., and M. Yu. "Asymmetric Information, Financial Reporting, and Open-Market Share Repurchases." *Journal of Financial and Quantitative Analysis*, 51 (2016), 1165–1192.

Bonaimé, A. A.; K. W. Hankins; and B. D. Jordan. "The Cost of Financial Flexibility: Evidence from Share Repurchases." *Journal of Corporate Finance*, 38 (2016), 345–362.

Booth, J. R., and R. L. Smith. "Capital Raising, Underwriting, and the Certification Hypothesis." *Journal of Financial Economics*, 15 (1986), 261–281.

Chaplinsky, S., and D. Haushalter. "Financing under Extreme Risk: Contract Terms and Returns to Private Investments in Public Equity." *Review of Financial Studies*, 23 (2010), 2789–2820.

Chemmanur, T. J., and P. Fulghieri. "Investment Bank Reputation, Information Production, and Financial Intermediation." *Journal of Finance*, 49 (1994), 57–79.

Clinton, S.; J. White; and T. Woidtke. "Differences in the Information Environment Prior to Seasoned Equity Offerings under Relaxed Disclosure Regulation." *Journal of Accounting and Economics*, 58 (2014), 59–78.

Dechow, P. M., and I. D. Dichev. "The Quality of Accruals and Earnings: The Role of Accrual Estimation Errors." *Accounting Review*, 77 (2002), 35–59.

Dittmar, A., and L. C. Field. "Can Managers Time the Market? Evidence Using Repurchase Price Data." *Journal of Financial Economics*, 115 (2015), 261–282.

Eckbo, B. E.; R. W. Masulis; and O. Norli. "Security Offerings." In *Handbook of Corporate Finance: Empirical Corporate Finance*, Vol. I, B. E. Eckbo, ed. Amsterdam, The Netherlands: Elsevier/North-Holland (2007), chap. 6.

Francis, J.; R. Lafond; P. Olsson; and K. Schipper. "The Market Pricing of Accruals Quality." *Journal of Accounting Economics*, 39 (2005), 295–327.

Gao, X., and J. R. Ritter. "The Marketing of Seasoned Equity Offerings." *Journal of Financial Economics*, 97 (2010), 33–52.

Gustafson, M. T., and P. Iliev. "The Effects of Removing Barriers to Equity Issuance." *Journal of Financial Economics*, 124 (2017), 580–598.

Huang, R., and J. R. Ritter. "Corporate Cash Shortfalls and Financing Decisions." Working Paper, University of Florida (2017).

Lee, G., and R. W. Masulis. "Seasoned Equity Offerings: Quality of Accounting Information and Expected Flotation Costs." *Journal of Financial Economics*, 92 (2009), 443–469.

McLean, R. D. "Share Issuance and Cash Savings." *Journal of Financial Economics*, 99 (2011), 693–715.

Morrison & Foerster LLP. "Frequently Asked Questions about At-the-Market Offerings." White Paper (2017).

Petersen, M. A. "Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches." *Review of Financial Studies*, 22 (2009), 435–480.

Shroff, N.; A. X. Sun; H. D. White; and W. Zhang. "Voluntary Disclosure and Information Asymmetry: Evidence from the 2005 Securities Offering Reform." *Journal of Accounting Research*, 51 (2013), 1299–1345.