

The Twilight Zone: OTC Regulatory Regimes and Market Quality

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August 2013

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Abstract

We analyze a comprehensive sample of more than 10,000 U.S. OTC stocks. We first show that the OTC market is a large, diverse, and dynamic trading environment with a rich set of regulatory and disclosure regimes, comprising venue rules and state laws beyond SEC regulation. We then exploit this institutional richness to analyze two key dimensions of market quality, liquidity and crash risk, across firms and regulatory regimes. We find that OTC firms that are subject to stricter regulatory regimes and disclosure requirements have higher market quality (higher liquidity and lower crash risk). Our analysis points to an important trade-off in regulating the OTC market and protecting investors: Lowering regulatory requirements (e.g., for disclosure) reduces the compliance burden for smaller firms, but it also reduces market quality.

Keywords: Securities Regulation, Disclosure, Liquidity, Crash Risk, Blue Sky Laws, Pink

JEL Classification: G14, G15, G30, K22, M41, M48

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“Providing thought leadership on international business, financial markets and public policy”



*Charles A. Dice Center for
Research in Financial Economics*

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1. Introduction

Aside from its highly regulated traditional exchanges, the U.S. has a large OTC market offering less investor protection, in which over 8,000 domestic stocks were publicly traded in 2010. For over 4,500 of these stocks, the issuer was not an SEC registrant required to provide regular disclosure filings. OTC firms exempt from federal securities laws are often referred to as “dark.” However, these firms are subject to state corporate and state securities laws as well as trading venue rules requiring disclosures. Thus, it is more accurate to characterize the OTC market as a “twilight zone” with many regulatory regimes. At present, there is very limited research on this market. Our study sheds light on this multi-faceted market, its regimes and their effects on market quality.

A core objective of regulation in securities markets is to ensure market integrity and investor protection (e.g., Goshen and Parchomovsky, 2006; Mahoney, 2009). In pursuing this objective, regulators often impose disclosure requirements on firms. However, strict regimes are particularly costly to smaller firms due to economies of scale in compliance. Thus, regulators face a trade-off between creating a viable market with low disclosure burdens for small firms and their charter to ensure market integrity and protect investors. This trade-off is pertinent in the OTC market, populated overwhelmingly by small firms. It also featured prominently in the discussion about the 2012 JOBS Act, which intended to lower the regulatory burden on small growth firms to improve their access to public capital markets as well as secondary market liquidity.¹ One of its key provisions provides more generous exemptions from SEC registration. As a result, more firms can sell their securities to the public, yet remain outside the SEC disclosure regime. It is therefore important to study regulatory regimes beyond SEC registration as well as the role of SEC disclosure requirements in the OTC market.

¹ See, e.g., Coates’ (2011) testimony before the Senate Subcommittee. A similar debate about the regulatory burden facing smaller firms took place after the 2002 Sarbanes-Oxley Act (see Coates and Srinivasan, 2014).

Thus, we pursue two distinct goals with this paper. First, we provide novel descriptive evidence on the broad cross-section of firms trading in different OTC market venues, for instance, with respect to entry, survival, venue changes, reporting status and trading activity. To this end, we compile and examine a comprehensive sample of stocks trading in the venues that comprise the OTC market. Second, we analyze the effect of OTC regulatory regimes on market quality. We focus on two key aspects of market quality: liquidity and crash risk, which are both closely linked to the aforementioned objective of securities regulation. Concerns about market integrity could result in lower investor participation and impair liquidity (e.g., Guiso et al., 2008). Yet, liquidity provision is a primary purpose of securities markets. Similarly, opacity and market manipulation can increase risks to investors and, inter alia, make stocks more prone to crashes (Jin and Myers, 2006), which could hurt trust in the market's integrity and, in turn, lower investor participation.

The OTC market had three trading venues during our sample period: the Bulletin Board, the Pink Sheets and the Grey Market. Bulletin Board firms had to file with the SEC since the Eligibility Rule in 1999. The other venues did not require SEC registration. However, until the JOBS Act, any publicly traded firm with more than \$10 million in assets and more than 500 record holders had to file with the SEC.² Thus, firms trading in the Pink Sheets or the Grey Market may be SEC filers that have to provide regular disclosure. For SEC registrants, federal law preempts state securities regulation and hence sets the relevant rules. For non-registrants, state securities laws (also called “blue sky” laws) require registration, which in most states amounts to a “merit review” of the issuer. State securities laws apply at the trade level as well as in the issuer's home state. There are few studies on the capital-market effects of state securities regulation.³

² Rule 12g5-1, Securities and Exchange Act of 1934. Note that record holders are not beneficial shareholders. Many shares are held in street name by financial institutions, in which case the latter are the holders of record.

³ An exception is Agrawal (2013). He analyzes investor protection and corporate policy around the introduction of

An important way in which firms can comply with state securities laws is to use the so-called “manual exemption.” In 41 states and the District of Columbia, issuers are exempt from registration and “blue-sky compliant” if they appear in a nationally recognized securities manual. The providers of such manuals (e.g., Mergent, Standard & Poor’s) perform a basic review of documents supplied by issuers, e.g., examine business description, corporate history and financial statements. Manuals are published annually but frequent updates are available via print media and email. We are not aware of any research on the effects of securities manual coverage on market quality.

In addition to federal and state regulation, there are venue-based regimes. Aside from the Eligibility Rule for the Bulletin Board, the Pink Sheets market operator (now called OTC Markets Group) introduced several tiers and information labels in 2007, differentiating firms for which current, limited and no information is available. It created a “Caveat Emptor” label to flag firms with public interest or fraud concerns. All tier designations and labels are monitored by the OTC Markets Group and revised as firms’ information status changes. Again, there is limited research on venue-based disclosure regimes (Bushee and Leuz, 2005; Jiang et al., 2015).

Our sample consists of 10,294 domestic firms that trade in the OTC market between 2001 and 2010 and are incorporated in the U.S., mostly in Delaware and Nevada. The OTC market consists primarily of micro-cap stocks spanning a broad set of industries. The average market value is about \$50 million, but it is skewed by a few large firms with a capitalization exceeding \$1 billion. Most firms have a market value below \$20 million. The median share price is \$0.97, consistent with OTC firms being called “penny stocks.” About 17% of the sample firms enter the OTC market because they delist from the traditional exchanges (“fallen angels”). In addition, over 3,000 “new” firms appear in the OTC market between 2001 and 2010 without a prior exchange listing. The latter

state securities regulation, which predates the SEC regime. State regulators have been protecting investors from fraud since the first “blue sky” law in Kansas in 1911 (Macey and Miller, 1991).

finding is striking in light of the recent dearth of U.S. IPOs (e.g., Gao et al., 2013; Doidge et al., 2015). However, less than 7% of the new OTC firms eventually trade up to the exchanges during our sample period.⁴ Hence, our analysis shows that the OTC market is not a breeding ground for new growth firms that eventually graduate to the traditional exchanges. At the same time, most OTC stocks survive for long periods, even those delisted from the exchanges. The five-year survival rate is between 52% and 72%, and the median firm is quoted for almost 9 years. Thus, the OTC market is more than an interim home for firms that are on their way out of the public markets.

The stock return over the sample period is negative for a majority of OTC firms. At the same time, average monthly volatility is more than twice as high as the volatility of NASDAQ Small Cap stocks. In addition, a substantial fraction of OTC stocks exhibit episodes of extreme returns over the sample period (e.g., returns above 100% or below -95%). These findings are consistent with Ang et al. (2013) and Eraker and Ready (2015). In general, trading activity is much lower than on the traditional exchanges. On average, the proportion of trading days is 40% across all firm-months in the OTC market and, on days with trading, the average daily volume is only around \$32,000. But, as with other characteristics, there is substantial heterogeneity in the cross-section. For example, about 11% of OTC stocks trade almost every day, while a quarter of them have zero volume on 95% of trading days.

After this characterization of the OTC market, we analyze how OTC regulatory regimes relate to market liquidity and crash risk, both in the cross-section and around regime changes. An extensive body of theory relates market liquidity to information asymmetry and adverse selection in stock markets (e.g., Copeland and Galai, 1983; Glosten and Milgrom, 1985; Kyle, 1985; Easley and

⁴ One of these firms is NASDAQ, which traded on the Bulletin Board between 2002 and 2005. We describe the NASDAQ case along with various other examples in section IA.12 in the Internet Appendix. Trading up to the exchanges is most common for banks, pharmaceuticals, biotech & health care firms, and oil & gas producers.

O'Hara, 1987; Admati and Pfleiderer, 1988; Diamond and Verrecchia, 1991). According to this work, limited disclosure exacerbates information asymmetry and impairs liquidity. For crash risk, prior studies suggest two potentially relevant channels, which could also interact. First, information asymmetry between insiders and outsiders coupled with opacity about firm fundamentals allows bad news to accumulate; upon revelation, this leads to a crash (Jin and Myers, 2006; Hutton et al., 2009). Limited disclosure not only increases information asymmetry but also exacerbates opacity about fundamentals, and hence increases crash risk. Second, short-sale constraints can independently or in conjunction with opacity contribute to crash risk by essentially allowing overly optimistic traders to inflate stock prices (Miller, 1977; Hong and Stein, 2003; Ang et al., 2013). Opacity about fundamentals makes it easier for opinions to diverge, while limited disclosure and the ensuing illiquidity make short-selling more difficult. Based on these arguments, we expect stricter regulatory regimes in the OTC market to increase liquidity and reduce crash risk.

We use principal factor analysis to construct proxies for liquidity and crash risk based on two input variables for each measure. For the liquidity proxy, we use the proportion of zero-return days and share turnover. For the crash risk proxy, we follow Chen et al. (2001) and Hutton et al. (2009) and use the negative skewness of returns and a binary indicator for a crash, defined as a cumulative (log) return below -95%. To validate these proxies, we provide evidence that our liquidity proxy is highly correlated with other commonly used liquidity measures, and that (future) crash risk is elevated when firms are subject to pump-and-dump schemes, which often end in crashes.

Starting with trading venue regressions, we find lower market liquidity and higher crash risk in the OTC market than on the traditional exchanges. Moreover, both market quality proxies change monotonically when moving from the Bulletin Board to the Pink Sheets to the Grey Market. The decline in liquidity and increase in crash risk are consistent with a ranking of these venues in terms

of their regulatory strictness and disclosure requirements. Next, we show that OTC firms that have to file 10-Ks and 10-Qs with the SEC have higher market liquidity and lower crash risk. These results hold with firm fixed effects and, additionally, propensity matched SEC and non-SEC filers. Similarly, OTC firms that are covered in Mergent's or Standard & Poor's securities manuals exhibit higher liquidity and lower crash risk, though the latter relation is not robust to firm fixed effects and hence could be due to selection. As the assignment of firms to OTC regimes can depend on firm choices, we exploit venue transitions, ticker changes tied to changes in SEC filing status, and differential regulatory oversight for financial institutions to provide evidence that the market quality results are likely attributable to the regimes, i.e., trading venues, required SEC disclosures and manual inclusion, rather than firm selection, changes in firm fundamentals or reverse causality.

Next, we analyze the effects of differences in blue sky laws. As state securities laws generally rely on merit reviews by state regulators, the mechanism by which they affect markets is less clear than in the case of federal securities laws, which are based on a disclosure doctrine. Firms' registration filings with the state regulators are generally not easily accessible. Hence, the information contained in these filings is unlikely to directly contribute to an increase in market liquidity or a decrease in opacity-induced crash risk. However, merit reviews by state securities regulators could have an indirect effect on market quality, e.g., by encouraging firms to satisfy blue sky laws via the manual exemption and hence manual disclosure or, alternatively, by screening out firms for which concerns about adverse selection and investor protection are more severe. Consistent with these indirect effects, we find that liquidity is higher for firms located in states with tougher merit reviews. The results for crash risk, however, are statistically and economically insignificant. To increase our confidence that the liquidity results are indeed related to differences in state securities regulation, we show that the results are stronger in states that do not allow manual

publication to substitute for state registration and merit review. We also exploit changes in firms' headquarters and show that the liquidity results continue to hold with firm fixed effects.

Turning to venue-based regulation in the Pink Sheets, we analyze whether firms in better information tiers exhibit higher market liquidity and lower crash risk, as our earlier discussion of theory would predict. Using firm fixed effects, we find that market liquidity (crash risk) increases (decreases) monotonically from the lowest to the highest Pink Sheets tier. The Caveat Emptor label for stocks with investor protection concerns is associated with lower liquidity and higher crash risk. To further tighten identification, we again exploit differential regulatory oversight for financial and non-financial firms, and find that the results are present only for the less regulated non-financials. This is consistent with the results being attributable to the Pink Sheets information tiers. Furthermore, we exploit four regulatory changes in the Pink Sheets in order to perform a within-firm, difference-in-differences analysis relative to the Bulletin Board. We show that market liquidity (crash risk) increases (decreases) as the regulatory regime in the Pink Sheets becomes stricter. Following the implementation of these regulatory changes, market quality in the Pink Sheets has essentially caught up with that in the Bulletin Board.

Our paper makes several contributions to the literature. First, our study paints the most complete picture of the U.S. OTC market to date. We create a novel dataset that allows us to make distinctions within the OTC market in terms of trading venue, reporting status and regulatory regimes. We provide extensive descriptive statistics on industry, location, state of incorporation, market entry, survival, trading venue changes, and trading activity. Such descriptive evidence is important considering how little is known about this market and its regulatory regimes.

Second, we examine federal-, state-, and venue-specific regulatory regimes in the OTC market and provide evidence on the link between these regimes and market quality. The OTC market is

often viewed as unregulated and populated by dark firms when in fact it is a thicket of regulatory regimes. We exploit this institutional richness to show that market quality increases with stricter disclosure regulation and regulatory oversight. As such, our analysis points to an important trade-off in regulating the OTC market and protecting investors: While lowering regulatory requirements (e.g., for disclosure) reduces the compliance burden for smaller firms, it also significantly reduces market liquidity and increases crash risk for investors.

Two important papers, Ang et al. (2013) and Eraker and Ready (2015), also examine the OTC market. Their analyses focus on asset pricing, stock returns, and investor preferences.⁵ Our study complements these studies by focusing on market quality and analyzing previously unavailable trading venue and regulatory distinctions for a much broader cross-section of firms. We link these distinctions to crash risk. Moreover, our liquidity analysis provides a more nuanced understanding of investor behavior in the OTC market, suggesting that investors recognize regulatory and information differences across regimes and trade (or abstain) accordingly.

Our paper is also related to the international literature on legal institutions, investor protection and equity market development, starting with La Porta et al. (1997, 1998). This work demonstrates that disclosure requirements exhibit significant associations with other institutional factors (e.g., investor protection, rule of law) and with various market outcomes (e.g., cost of capital, size of the equity market, IPO activity, and market liquidity).⁶ However, its focus is on countries' main equity markets, which have extensive disclosure requirements and are populated by much larger firms, for which the compliance trade-off is different. Our findings for the opaque U.S. OTC market are

⁵ There are a few other OTC market studies (Luft et al., 2001; Luft and Levine, 2004; Bushee and Leuz, 2005; Marosi and Massoud, 2007; Leuz et al., 2008; Bollen and Christie, 2009; Jiang et al., 2015). These studies have specific or smaller OTC samples, cover specific events and/or do not make venue and reporting status distinctions.

⁶ See, e.g., Hail and Leuz (2006), La Porta et al. (2006), and Lang et al. (2012). See also Karolyi (2015) for an overview. As these studies rely mostly on cross-country variation, the identification of particular institutional factors (e.g., the disclosure regime) is limited, and our results could not be inferred from these papers.

relevant to countries' regulatory regimes and markets for small and young firms.

Lastly, we provide novel evidence on institutions in the OTC market, including state merit reviews, manual exemptions, manual publications as well as Pink Sheets information tiers. We know very little about these institutions, yet they govern trading for the several thousand U.S. publicly traded stocks not covered by federal securities laws.

2. Regulatory regimes in the OTC market

In this section, we introduce the regulatory regimes for securities trading in the OTC market during our sample period (see Figure 1 and the Appendix for further institutional details). We also discuss the economics of regulatory regimes and firm responses.

2.1 OTC trading venues: Bulletin Board, Pink Sheets and Grey Market

The Penny Stock Act of 1990 mandated that the SEC create an electronic system for the OTC market that displays quotes and last-sale information. The Bulletin Board (BB) opened in June 1990 and is currently operated and regulated by FINRA. It is an electronic quotation system that transmits real-time dealer quotes, trade prices and volume information to subscribing FINRA market makers. The BB does not have minimum size or corporate governance requirements. A series of changes were made to the BB during the 1990s, culminating in the 1999 Eligibility Rule (Bushee and Leuz, 2005). This rule states that issuers of securities traded on the BB have to file financial information with the SEC or other regulators for banking or insurance. Therefore, all our BB firms should provide disclosures to the SEC or other regulators.

The second venue in the OTC market is widely known as the Pink Sheets, which are operated by the OTC Markets Group.⁷ The Pink Sheets compete with the BB by providing an electronic

⁷ The market was first established in 1913 as the National Quotation Bureau (NQB). For decades, the NQB reported stock quotations via the paper-based Pink Sheets. The NQB changed its name to Pink Sheets LLC in 2000, to Pink

real-time quotation and execution system for all OTC securities. In addition to firms that do not file with the SEC and hence cannot be quoted on the BB due to the Eligibility Rule, virtually all BB securities are also quoted and traded on the OTC Markets Group's platform.⁸ For this reason, OTC securities in the two venues essentially have the same trading mechanism.

In August 2007, the Pink Sheets introduced a tier system to indicate the levels of financial disclosure for companies quoted on its platform. This system was revised in 2010. It distinguishes OTCQB and OTCQX firms, which are subject to SEC or equivalent regulatory reporting requirements (and more), from OTC Pink firms, which have no SEC or equivalent reporting requirements. Firms in the latter category are further divided into three tiers, Pink Current, Pink Limited and Pink No Information, based on the level and timeliness of the information they provide to investors (see section 1 in the Appendix for more details). The Pink Sheets also apply a Caveat Emptor label and block quotes on its website when there are investor protection concerns about a company.

Finally, the Grey Market contains firms that are not quoted in any market, i.e., no bid and ask prices are available. Trades in Grey Market stocks are made by broker-dealers and reported to their Self-Regulatory Organization (SRO), and the SRO in turn distributes this information.

2.2 Rules for quoting and trading OTC securities

There are few real IPOs in the OTC market. Instead, “new” firms appear in the OTC markets as market makers provide quotes for formerly untraded securities. Firms initially raise capital from a small group of investors and in forms that are exempt from SEC registration (e.g., Rule 144A). These shares are first restricted from trading for a certain period, but once the restriction ends, the

OTC Markets in 2008, and adopted its current name, OTC Markets Group, in 2010. We use the term “Pink Sheets” as the market went by this name for most of our sample period and “Pink” is still used for one market segment.

⁸ By October 2010, our dataset contains only nine BB securities that are not also quoted in the Pink Sheets, compared to 1,993 dually-quoted BB firms.

owners may approach a broker-dealer to initiate quotation.⁹ In order to start quoting and trading non-reporting OTC securities, broker-dealers have to rely on Rule 15c2-11 of the 1934 Exchange Act. This rule prescribes information review and maintenance requirements for broker-dealer firms that publish quotations. Specifically, the rule prohibits a broker-dealer from quoting unless it has obtained and reviewed current information about the issuer that the broker-dealer believes is accurate and obtained from a reliable source.

Such information can be a prospectus for a SEC registered security; an offering circular, the most recent annual report as well as any quarterly report that has been filed after the annual report. Moreover, the broker-dealer shall keep this information “reasonably” current, and make this information “reasonably” available to a potential investor upon request. A broker-dealer may initiate (or resume) quotations for an OTC security by filing Form 211 with FINRA.¹⁰ Rule 15c2-11 also includes a piggy-back exemption stating that a broker-dealer may begin quoting a security without filing Form 211, provided another dealer has been publishing quotations for the security with some frequency over the last 30 days. Hence, only one broker-dealer needs to file Form 211 for a particular security. Importantly, as broker-dealers can subsequently piggy-back on their own quotations, non-reporting OTC firms do not have to provide regular disclosures to broker-dealers.

2.3 Further OTC market regulation: State registration and manual exemption

The Securities Act of 1933 requires that securities offered or sold to the public in the U.S. are registered with the SEC. In addition, the Exchange Act of 1934 requires the firm to file reports with

⁹ New OTC companies can also appear through reverse mergers and as foreign ADRs. In a reverse merger, a private company merges with an OTC-quoted shell company, and the formerly private firm becomes the new OTC quoted firm. Our sample does not include ADRs.

¹⁰ The form certifies that the broker-dealer has satisfied all relevant requirements of SEC Rule 15c2-11 and the filing and information requirements of NASD Rule 6640. Rule 15c2-11 also contains an exception for quotations representing a customer’s unsolicited orders or indications of interest, provided there are adequate records. The OTC Markets Group discloses the number of new 211 filings in its annual report. There were 760, 797, and 627 such filings in 2013, 2014, and 2015, suggesting a substantial number of new firms in recent years.

the SEC on a continuing basis unless the firm falls below certain size and ownership thresholds.¹¹ Issuers can avoid registering securities with the SEC by issuing securities under one of several exemptions for limited circulation offerings.¹² As long as an issuer using one of these exemptions does not surpass the Exchange Act size and record-holder thresholds, it does not have to file reports with the SEC. These firms nevertheless face state laws and venue-based rules. This section briefly describes the role of state securities laws (also called blue sky laws). Section 2 in the Appendix provides further details on these laws.

State securities laws require registration of offers, sales of securities and of brokers and investment advisors. Most states also assign liability for securities fraud. Historically, states examined applications for registration, i.e., conducted merit reviews, to determine whether or not to allow securities to be sold in the state. However, federal regulation exempts so called “federally covered securities,” i.e., stocks of SEC registrants listed on national exchanges. As a result, merit reviews apply primarily to OTC firms that do not register with the SEC.

To register with the state, applicants have to provide information to the state regulator similar to what is required for registration under the 1933 Act. State securities registrations are usually valid for one year only, and many states require the issuer to update the offering information (prospectus including financial statements) periodically. However, while the information filed with the state securities regulator is used in the merit review, it is typically not made publicly available in the way SEC filings are made available on EDGAR.¹³ Anecdotal evidence suggests that it is

¹¹ A firm is exempt from SEC registration if it has fewer than 300 shareholders of record, or it has fewer than 500 shareholders of record and less than \$10 million in total assets for each of its last three fiscal years. The JOBS Act of 2012, which became effective after our sample period, raises the threshold in some cases and excludes employees and investors that obtain shares via crowd-funding from the definition.

¹² Examples are Rule 144A; Regulation S; the intrastate offering exemption (Section 3(a)(11)); Regulation A (Section 3(b)); Regulation D (Rule 504, 505, and 506) and the accredited investor exemption.

¹³ In addition, state corporation laws can require firms to provide financial statements to its owners on a regular basis or upon request. However, these laws apply at the level of the record holder and hence, to our understanding, do

difficult to obtain registration filings even by visiting the state securities regulators' offices in person. In fact, less than half the states require that investors be furnished with a prospectus; even fewer jurisdictions specify that the distributed prospectus should include recent financial statements.

As long as the state securities registration is effective, secondary trading of the security is allowed, provided the trades involve only residents of states where the security is registered. In other words, if a trade involves investors from two states, the security has to be registered in *both* states for the trade to be legal. In addition, issuers are typically required to register in the state of their headquarters (home-state registration). Issuers have to renew their state securities registration(s) on a regular basis for secondary trading to continue.

The requirement to maintain effective registrations in multiple states is a cumbersome way to support secondary trading. Thus, issuers may seek to qualify for one of the exemptions to state securities registration. Perhaps the most effective way for a firm to obtain an exemption from registering its securities in each state where investors may reside is to be included in a nationally recognized securities manual (Manual Exemption). The firm furnishes the providers of manuals with information and pays an initial and maintenance listing fee. In turn, the providers of manuals perform a basic review of a company's business and its financial statements, and publish this information in a standardized form. The two most prominent manuals are Mergent's (previously Moody's) Manual and Standard & Poor's Corporation Records. 42 jurisdictions explicitly recognize these two manuals when granting exemption from state securities registration.

not lead to disclosure to beneficial owners or prospective shareholders. See section 3 in the Appendix for more details.

2.4 OTC regulatory regimes and firm choice

Before turning to our empirical analysis, it is important to briefly discuss the economics of regulatory regimes and firm choice. We preface this discussion by noting that OTC firms do not necessarily choose their regulatory regime and/or trading venue. For instance, SEC reporting is mandatory and determined by firm size and the number of record holders. OTC market makers, not the firm, choose the trading venue where the stock is quoted. The tiers and labels in the Pink Sheets are determined and assigned by the OTC Markets Group. The fact that in many cases the assignment to a regulatory regime is determined by external parties, rather than the firm, mitigates (but does not eliminate) concerns about selection on firm fundamentals.

To the extent that firms actively choose their regulatory regime (or aspects thereof), managers are expected to trade off the benefits of stricter regulatory and disclosure regimes, such as higher liquidity and lower crash risk, against the cost of compliance. Due to economies of scale, the costs of compliance are likely declining in firm size. Similarly, better firms and managers should find it easier to comply with stricter regimes. Thus, not all firms prefer strict regimes.¹⁴ Given these cost-benefit considerations for firms, it can make sense for regulators to provide a menu of regimes that differ in strictness for firms to select from, which in turn alleviates the trade-off faced by regulators. On one hand, they want to create a viable market for small growth firms, but small firms find strict regimes costly to comply with. On the other hand, regulators are charged with the responsibility of protecting investors, and doing so is easier with stricter regimes.

¹⁴ The choice between regulatory regimes has been modeled in Shleifer and Wolfenzon (2002) and Doidge et al. (2004), albeit in different contexts. The basic idea in their models is that stricter securities regulation and disclosure requirements protect and reassure outsiders by providing a form of bonding, which makes it easier for firms to raise external finance. But not all firms opt for such bonding because stricter regulation also reduces the private benefits to insiders. Thus, firms with fewer growth opportunities and lower external financing needs might prefer to stay more opaque, rather than to bond via a stricter regime.

Firm choices raise selection issues in our empirical work, and our analysis of the link between the various OTC regulatory regimes and market quality therefore faces a number of identification challenges, as most regulatory analyses do. In response to these challenges, we provide additional tests that considerably tighten identification for each regulatory dimension of interest. We acknowledge, however, that it is difficult to estimate the causal effects of the regimes and that the results need to be interpreted cautiously.

3. Data and sample

Our sample is based on two data sources: a proprietary dataset provided by NASDAQ and Datastream. The NASDAQ dataset includes the venue history of all equity securities that traded in the OTC market or the NASDAQ Small Cap Market (SCM) at some point during the period January 2001 through October 2010.¹⁵ Datastream provides capital market data (e.g., stock prices and returns, market values, trading volume) and industry information for a large set of equity securities around the world. We match the NASDAQ venue history and Datastream via the CUSIP and/or the company name, resulting in an initial sample of 16,965 firms. We first eliminate firms that are incorporated outside the United States using several data sources (SEC filings, 20-F filings, NASDAQ issuer profiles and manual checks). We also exclude Real Estate Investment Trusts (REITs), firms with short capital market histories, firms whose securities are very rarely traded and firms for which the OTC market is not the main trading venue for their securities (see Table 1, Panel A, for details). Our final sample consists of 10,507 firms.

Since the NASDAQ venue history distinguishes only between the Bulletin Board (BB) and all other segments (NBB) within the OTC market, we collect information on specific OTC segments

¹⁵ The NASDAQ dataset comprises the full venue history of each security it covers. This feature enables us to identify firms that trade up to (“rising stars”) or down from (“fallen angels”) the traditional exchanges.

using two proprietary datasets provided by the OTC Markets Group. The first dataset (PS venue history) allows us to identify firms that are dually quoted on the BB and Pink Sheets and to distinguish Grey Market and Pink Sheets firms within the NBB. However, the PS venue history covers a shorter period (February 2003 to October 2010) and includes fewer firms during this period than the NASDAQ venue history does (about 60% of BB/NBB). The second dataset (PS tier history) enables us to disaggregate the NBB into several information tiers (Pink Current Information, Pink Limited Information and Pink No Information) and to identify firms flagged as Caveat Emptor. The PS tier history also covers a shorter time period (October 2007 to October 2010) and includes only a subset of firms in the NASDAQ venue history (about 50% of NBB).¹⁶

We use directEDGAR to retrieve 10-K and 10-Q filings by our sample firms during the sample period in order to develop a precise SEC filing history for each firm. We also use directEDGAR to identify the state of headquarters (SoHqt) and the state of incorporation (SoInc) for SEC filers. For non-filing firms, we gather SoHqt/SoInc details from a proprietary NASDAQ dataset that includes issuer profiles for most of the firms in our sample. For non-filing firms that are not covered by the NASDAQ issuer profiles, we attempt to gather SoHqt/SoInc information manually (e.g., from the website of the OTC Markets Group).¹⁷ Finally, we use Mergent's Manuals (yearly company lists from 2001 to 2010) as well as Standard & Poor's Corporation Records (half-yearly company lists from 2003 to 2010) to identify firms that are covered in the two key securities manuals.

State securities or blue sky laws generally rely on merit reviews, and apply at the trade level or in a firm's state of headquarters. We assign state securities laws according to a firm's state of

¹⁶ The datasets provided by NASDAQ and the OTC Markets Group enable us to identify venues for each firm and trading day. We aggregate this information to the monthly level by assigning a firm to the venue where it trades for the majority of the month (e.g., for a firm switching from BB to NBB on July 10, we assign "NBB" as its trading venue for July). In our regression analyses, we exclude the transition month for the switching firm. Datastream information on trading venues is static and, thus, does not allow us to identify a venue history.

¹⁷ We were unable to identify the SoHqt (SoInc) for 354 or 3.4% (211 or 2.0%) of our sample firms.

headquarters because most states require home-state registration and trades are often likely to involve buyers and sellers in the home state. We collect merit review scores for each state from three sources: (1) Nancy Fallon-Houle (www.nfhlaw.com), a law firm that specializes in blue sky laws and tabulates merit reviews for Regulation A filings on a scale from 0 to 3; (2) Wolters Kluwer Tax & Accounting's CCH Intelliconnect ranks, on a scale from 0 to 3, merit reviews for S-33 filings participating in the North American Securities Administrators Association's Coordinated Equity Review Program; and (3) the Small Business Guide codes SCOR merit reviews on a scale from 0 to 3. Our analysis uses the average of these three scores. We rescale this average (i.e., divide it by 3) to have a minimum value of zero and a maximum value of one.

Our data collection process results in a dataset that comprises 937,386 firm-month observations over the period January 2001 through October 2010.¹⁸

4. Descriptive analysis

4.1. Sample groups

Table 1, Panel B, classifies our sample into various groups with similar venue histories. 10,294 firms trade in the OTC market at some point. We also have 213 benchmark firms that trade only in the NASDAQ's small cap segment (*NASDAQ SCM*). The vast majority (77%) of the OTC sample firms remain in the OTC market throughout, either from January 2001 onwards (*In OTC only (start in 2001)*: 4,898 firms), as new firms that enter the sample after January 2001 (*New firms (remain in OTC)*: 2,782 firms), or as comeback firms that enter the sample after January 2001, but have a SEC filing history before January 2001 (*Comeback firms (remain in OTC)*: 270 firms). 1,714 firms (17%) trade down from the traditional exchanges to the OTC market (*Fallen angels (from*

¹⁸ However, most analyses are based on fewer observations due to missing information or sample filters. We truncate capital market variables at the top and bottom 1% unless the variable is naturally bounded or logged.

exchange)). Only 6%, or 630 firms (comprising *Rising stars (start in 2001)*: 367 firms; *Rising stars (new firms)*: 192 firms; and *Rising stars (comeback firms)*: 71 firms) trade up from the OTC market to the traditional exchanges. Untabulated statistics show that the number of *New firms* entering the OTC market each year is between 250 and 500 for most of the sample period, declining to about 100 per year after the financial crisis in 2008. Recall that *New firms* do not have any SEC filing history (and hence are not *Comeback firms*) and usually appear through quote initiation without a formal IPO (see section 2.2). This evidence on new OTC firms is in contrast to the drop in IPOs on traditional U.S. exchanges starting in the early 2000s (e.g., Gao et al., 2013; Doidge et al., 2015).

Table 1, Panel C, shows that 77% of the OTC sample (8,084 of 10,507 firms) files 10-Ks and 10-Qs with the SEC at some point during the sample period. The column *Fraction SEC filing while in OTC* shows that, while many *Fallen angels* tend to stop filing with the SEC after trading down to the OTC market (fraction of SEC filings: 43%), the vast majority of *Rising stars* already register with the SEC before trading up to the exchange (fraction SEC filing: more than 80%). Half of the OTC sample (5,125 firms) is included in securities manuals in at least one year. While in the OTC, *Fallen angels* appear in manuals with greater relative frequency than any other sample group. Only 2,071 firms (20%) are completely dark over the entire sample period, i.e., they never file with the SEC and never appear in the two securities manuals. Since trading venues outside the NBB require SEC filings, firms that are classified as *Rising stars* or *Fallen angels* cannot be completely dark.

In the Internet Appendix, we break down each sample group by industry, state of headquarters and state of incorporation (see section IA.1). Financial firms represent the largest group (3,142 firms or 31% of the OTC sample). Firms from industries that face high fundamental uncertainty (e.g., information technology, cyclical services) are relatively frequent in the *Fallen angels* group. While about 60% of the OTC firms are incorporated in Delaware or Nevada, their headquarters tend

to cluster in larger states (e.g., California, Florida, New York and Texas). In fact, 70% of the OTC firms choose to incorporate in a state that is different from their state of headquarters. In section IA.12 of the Internet Appendix, we provide examples of typical firms in the OTC sample groups, giving details on their main business, corporate evolution, and trading and reporting history.

4.2. Survival statistics and trading venue transitions

Table 2 presents descriptive statistics on firm entries to and exits from the OTC market and our sample (Panel A), venue transitions (Panel B) and stock price crashes (Panel C). Panel A shows that 66% (72%) of the OTC firms are part of the sample at the beginning (end) of the sample period in January 2001 (October 2010). This means that 34% of the OTC firms enter the sample later, as new firms, comeback firms or fallen angels, while 28% are removed from the OTC market prior to the end of the sample period. As expected, the attrition rate is relatively low among new OTC firms. For example, while only 12% in the *New firms (remain in OTC)* category fail to survive until the end of the sample period, this proportion is more than twice as high (at 32%) in the *In OTC only (start in 2001)* category. The *Fallen angels (from exchange)* category experiences the highest attrition rate (43%), which is not surprising given that these firms often delist from the exchanges due to financial difficulties (see also Harris et al., 2008; Macey et al., 2008).

In Panel B, we track trading venue changes for the sample firms over three different five-year windows starting in June 2001, June 2003 and June 2005, respectively. Very few NBB firms trade up to the BB or the traditional exchanges. For example, of the 3,697 firms on the NBB as of June 2003, only 8% (1%) are trading on the BB (on a traditional exchange) in June 2008; 77% of the firms continue to trade on the NBB, while 14% have been removed from the OTC market. BB firms are also unlikely to trade up. For example, of 2,638 BB firms as of June 2005, only 6% trade on a traditional exchange in June 2010, with 42% still trading on the BB, 37% demoted to the NBB,

and 15% having exited the OTC market. Taken together, this evidence suggests that venue changes in the OTC market are not uncommon but typically involve transitions to lower ranked venues.

Panel B shows that over 75% of the OTC firms “survive” for more than five years, in that they continue to be quoted. However, it is possible that firms crash and essentially die, yet continue to trade as shells. To explore this possibility, Panel C tracks the incidence of what we label a *Crash* over the same five-year windows.¹⁹ Firms are flagged as having crashed if they experience (i) a cumulative monthly return of -95% at some point during the five-year window and (ii) subsequently have a stock price below \$0.01 for at least six months. Depending on the time period, between 19% and 33% of NBB firms experience such a *Crash* in the subsequent five years. The proportion of crashes is slightly lower for BB firms (between 14% and 22%). Thus, even with a stricter definition of survival, the majority of OTC firms survive for more than five years.

4.3. Market-based firm characteristics and trading activity

We present descriptive statistics for a variety of market-based firm characteristics in the Internet Appendix (see section IA.2). The average (median) company in the OTC sample has a market value of about \$50 million (\$16 million) and a stock price of \$6.29 (\$0.97). While firms in the *Rising stars* groups tend to be larger (median market cap of more than \$100 million), most firms that start and remain in the OTC market have fairly low market values (median of about \$7 million). The stock performance of firms in the OTC market is, on average, negative over the entire sample period, but varies considerably across sample groups (e.g., *Fallen angels* vs. *Rising stars*). In addition, each sample group contains firms with positive and sometimes extremely high stock

¹⁹ Panel C analyzes sample firms that are not flagged as having crashed at the beginning of the tracking period. The number of firms in Panel C is therefore lower than in Panel B.

returns (see also Figure 3).²⁰ The volatility of monthly stock returns in the OTC sample is very high (e.g., a median of 37% per month versus 12% for benchmark firms on *NASDAQ SCM*). In summary, OTC firms tend to be small, have low stock prices (consistent with the penny stock label), and lottery-like payoffs, that is, negative average, but sometimes extremely positive, stock returns, and high return volatility. There is substantial variation in these characteristics, both within and across OTC sample groups.

Section IA.3 in the Internet Appendix provides statistics on trading activity by trading venue. In contrast to the statistics discussed thus far, we perform this analysis at the firm-month level (and not at the firm level). Across all firm-months in the OTC market (i.e., BB and NBB), the mean (median) proportion of trading days is about 40% (29%). On days with trading activity, the mean (median) daily trading volume is about \$32,000 (\$2,400). There is again considerable variation, with 11% of OTC stocks being traded almost every day and others hardly at all.

4.4. Market quality proxies

To examine how regulatory regimes in the OTC market are related to market quality, we focus on two key characteristics of market quality: liquidity and crash risk. We use two variables to measure each characteristic and then combine them into two summary proxies.

Given the low levels of trading activity in the OTC markets, we use the proportion of zero return days as proposed by Lesmond et al. (1999) and share turnover following Ibbotson et al. (2012) as input variables for the liquidity proxy. The proportion of zero return days is the fraction of trading days in a given month with zero returns. Share turnover is the average number of shares traded per day divided by the average number of shares outstanding in a given month. The liquidity

²⁰ The statistics in Table IA.2 are based on firm-level log returns, whereas Figure 3 shows the distribution of discrete returns at the firm-year level.

proxy is the first principal factor of these two variables. Higher (less negative) values of this proxy indicate greater market liquidity. In section IA.4 of the Internet Appendix, we validate our liquidity proxy by showing that it is highly correlated with two other liquidity measures that are commonly used in the literature (i.e., price impact and bid-ask spread) but not as frequently available for our sample. We also check that differences in free float do not unduly influence the measurement of share turnover.

For the (future) crash risk proxy, we follow Chen et al. (2001) and Hutton et al. (2009) by using the negative skewness of returns and a dummy variable capturing large negative returns as input variables. The negative skewness of returns is the negative coefficient of skewness, i.e., the negative of the third moment of daily log returns divided by the standard deviation of daily log returns raised to the third power.²¹ Negative skewness is measured over rolling three-month windows that include the current month and two subsequent months. The dummy variable indicates a cumulative log return below -95% over the same rolling three-month window.²² The crash risk proxy is the first principal factor of these two variables.²³ Higher values of this proxy imply higher future crash risk. We also validate this proxy by providing evidence that it increases significantly when OTC firms are subject to pump-and-dump schemes (see IA.4 in the Internet Appendix).

Table 3 reports descriptive statistics on both proxies and their input variables by trading venue. These statistics are computed using pooled data at the firm-month level. Liquidity (crash risk) tends to be higher (lower) in venues with stricter regulatory and disclosure regimes. For instance, the

²¹ We apply various filters to clean the return data. Apart from excluding rarely traded firms from the sample (see Table 1, Panel A) and truncating the data (see footnote 18), we also drop observations with market values below \$1,000 and sequences of observations with market values oscillating around \$1,000.

²² We compute the input variables for the crash risk proxy using log returns because discrete returns exhibit extreme outliers (see Figure 3). The use of log returns is also consistent with Chen et al. (2001). Note that a -95% log return is equivalent to a -61.3% proportional return.

²³ The factor loadings on the variables underlying the liquidity proxy and the crash proxy are estimated over the entire sample period. In untabulated analyses, we estimate the factor loadings by month and find that they do not vary much over time.

median values of both proxies for the BB are between those for the Grey Market and the NASDAQ Small Cap market. The association between the strength of OTC market regimes and market quality is analyzed in the remainder of the paper.

5. Regression analysis of market quality

5.1. Trading venues

In this section, we use multiple regressions to test whether market quality varies systematically across OTC trading venues. We hypothesize that market quality increases with the strength of the regulatory and disclosure regime of the trading venue. Figure 2 illustrates that the strength of the venue regulation increases as firms move from the Grey Market to traditional exchanges. We therefore expect market quality to be the highest for the traditional stock exchanges and lowest for the Grey Market. Table 4 reports the results. The analyses are based on either the full sample as described in Table 1 (NASDAQ venue history; January 2001 to October 2010) or a subsample based on the PS venue history (February 2003 to October 2010), for which we can separate Pink Sheets and Grey Market firms within the NBB. All regressions are estimated at the firm-month level, and include year-month and either industry or firm fixed effects.

The key variables in these regressions are the trading venue indicators: *Pink Sheets*, *BB*, *SCM* and *Exchange*. The omitted categories capture the least regulated trading venues (NBB firms when using the full sample or firms trading solely on the Grey Market when using the PS venue history). We include lagged *Log(Market value)* and lagged *Return volatility* as control variables in the market liquidity regressions. For the crash risk regressions, we follow Chen et al. (2001) and include lagged *Log(Market value)*, lagged *Return volatility*, lagged *Share turnover* and lagged *Cumulative return* as controls. In addition, all regressions include price-level dummy variables that indicate whether the median daily stock price over the previous three months is below \$0.01, \$0.10

or \$1.00, respectively. The t-statistics in these and all subsequent regression models are based on standard errors clustered by firm.

To address potential concerns about reverse causality, we impose sample filters eliminating observations immediately preceding trading venue transitions. Specifically, for the liquidity regressions, we exclude the month in which firms change trading venues. For the crash risk regressions, we impose a stricter filter to account for the longer estimation window for the crash risk proxy (i.e., we exclude the month of, and the six months before, venue changes).

Table 4, Panel A, presents the analysis for the liquidity proxy. The estimated coefficients on the trading venue indicators are positive and highly significant in all specifications. Thus, the omitted categories (NBB firms and Grey Market firms, respectively) contain the least liquid stocks. Furthermore, the coefficient estimates increase monotonically as the venues' information regimes become stronger, i.e., they are lowest for *Pink Sheets*, larger for *BB* and largest for *SCM* and *Exchange*. The magnitudes of the coefficients are also economically meaningful. For example, the coefficient estimates on *BB* in the full sample regressions (0.236 and 0.247) are more than one-third of the standard deviation of the liquidity proxy of 0.690 (not tabulated; Table 3 shows descriptive statistics by trading venue). The results are similar when we include firm instead of industry fixed effects, mitigating concerns about omitted variables and suggesting that unobserved firm-level heterogeneity has a limited effect on the association between trading venue and market liquidity. The coefficients on the control variables are significant and have the expected signs.

Table 4, Panel B, presents the analysis for crash risk. The venue coefficients are again highly significant with the expected signs and relative magnitudes in all specifications. That is, crash risk decreases as the information regime of the trading venue strengthens, after controlling for market value, return volatility, stock performance, and share turnover. As with the liquidity proxy, the

coefficient estimates are economically sizeable. For example, even the smallest coefficient estimate on *BB* (-0.101 in the first specification) corresponds to one-fifth of the standard deviation of the crash risk proxy in the full sample (0.494, not tabulated). The results are similar when using firm instead of industry fixed effects, mitigating concerns about omitted time-invariant characteristics. The coefficients on the control variables are broadly consistent with Chen et al. (2001).

To further tighten identification, we study the monthly changes in market quality in a short window spanning 6 months before through 6 months after the date of a firm's transition from one trading venue to another. As this analysis requires a market quality variable that can be measured over short intervals, we focus on liquidity and map out the liquidity response by estimating a separate coefficient for each month in event time, while including year-month and transition fixed effects. Figure 4 plots the liquidity response around venue transitions from the BB to the NBB and the NBB to the BB. We find that liquidity increases (declines) significantly right around the transition month when firms move to a trading venue with a stronger (weaker) information regime. The effect is fairly sharp and the difference in the coefficients around the transition (month $m+1$ relative to month $m-1$) is much larger than the next largest difference in the coefficients for adjacent months. There is little evidence of pre-transition trends in liquidity, which we would expect to see with reverse causality. We provide further details in section IA.5 of the Internet Appendix. Taken together, this supplementary analysis supports the interpretation that informational and regulatory differences across trading venues drive the results in Table 4. The subsequent analyses dig deeper into the associated regulatory regimes.

5.2. SEC filings and securities manuals

Next, we examine the relation between firms' disclosure status and market quality, while controlling for venue differences. Figure 2 illustrates the increasing level of disclosure, moving

from state securities laws to SEC registration. Specifically, we analyze SEC filings and a firm's inclusion in two prominent securities manuals (Mergent's Manuals and S&P Corporation Records). Both types of disclosure provide basic but important financial information to investors that otherwise is not readily available (see section 2). Table 5 reports the regression results.

In Panels A and B, the analyses are based on the NASDAQ venue history and include observations from all venues or from the NBB only (i.e., Pink Sheets and Grey Market). All regressions are estimated at the firm-month level and include year-month and either industry or firm fixed effects. The key variables of interest in these regressions are the dummy variables *SEC* and *Manual*. *SEC* is equal to one for firms that provide 10-Ks and 10-Qs to the SEC, and zero otherwise. All firms outside the NBB are SEC registrants by definition, that is, *SEC* equals zero only for those firms in the Pink Sheets or the Grey Market that do not file with the SEC. *Manual* is equal to one for firms that are included in either Mergent's Manual or the Standard & Poor's Corporation Records in a given year, and zero otherwise.²⁴ In addition, and consistent with the analyses in the previous section, we include trading venue indicators, lagged control variables and price-level controls. As in the venue regressions, we eliminate the month when disclosure changes from the liquidity regressions and the preceding six months from the crash risk regressions.

We estimate regressions based on the full sample. However, to mitigate concerns that the results are driven by changes in (observable) firm characteristics rather than disclosure regime changes, we also provide results for two propensity-matched samples. In the regressions based on observations from all venues, we match on *Manual* using *SEC* and the other control variables (lagged market values, lagged return volatility, lagged stock price and dummy variables for

²⁴ Many SEC filers also appear in one of the manuals. For instance, of the 41,987 firm-months in the NBB sample with an SEC filing, 16,274 (i.e., 39%) are associated with manual publication. Across all venues, the fraction is 45% (=197,513/436,768). The fact that so many firms pay to appear in a manual despite being SEC registrants suggests that manuals confer potential benefits beyond improved market quality, e.g., enhanced visibility.

industry, state of headquarters and each half-year) as matching variables. In the regressions based on observations from the NBB only, we match on *SEC* using *Manual* and the other control variables as matching variables. We perform the propensity matching twice in each year, for the periods January – June and July – December, without replacement, and using a maximum propensity score distance (or caliper) of 0.0001.

In Table 5, Panel A, we present results for liquidity. The estimated coefficients on *SEC* and *Manual* are positive and statistically significant in all specifications, with industry or firm fixed effects. The latter specifications control for any time-invariant heterogeneity across firms. We also estimate regressions for a propensity-matched sample, and still find significant, albeit slightly smaller coefficients. The results indicate that firms that file with the SEC and/or are included in at least one of the securities manuals exhibit higher market liquidity. The magnitudes are economically meaningful. In all models, the coefficient estimates on *SEC* and *Manual* are 0.040 or higher, implying a liquidity difference of at least 6% of the standard deviation of the liquidity proxy of 0.691 in the regression sample (not tabulated). Using the two input variables of the liquidity proxy (i.e., the proportion of zero return days and share turnover) to gauge the economic magnitudes, we find that reporting to the SEC or inclusion in a manual implies an increase in liquidity of roughly 5% to 10% relative to average liquidity in the sample (not tabulated).

In Table 5, Panel B, we present results for crash risk. The coefficient estimate on *SEC* is negative and statistically significant in all specifications, indicating that firms filing with the SEC exhibit lower crash risk. The results tend to become stronger when including firm instead of industry fixed effects and when using a propensity matched sample. Manual inclusion is also associated with significantly lower crash risk when we include industry fixed effects. However, this association becomes insignificant with firm fixed effects. When they are statistically significant,

the coefficient estimates are also economically meaningful. For example, untabulated calculations show that the coefficient estimate on *SEC* of -0.071 in the all-venues specification with firm fixed effects implies a crash risk difference between SEC filers and non-filers equal to 14% of the standard deviation of crash risk (0.493), and hence would move a firm that is in the 30th percentile of crash risk to the median.

For SEC registrants, inclusion in a securities manual should have a smaller or no effect. We examine this conjecture by adding *Manual*SEC* to the regression specification (results not tabulated). For crash risk, the coefficients on this interaction term are positive and offset the coefficients on *Manual*, implying that the impact of manual inclusion on crash risk is entirely absent for SEC registrants. For liquidity, the coefficient on *Manual*SEC* is significantly negative in one model and insignificantly different from zero in the remaining models. Thus, the effect of manual inclusion on liquidity is similar or only slightly weaker for SEC registrants, potentially consistent with visibility-related benefits.

Next, we exploit the fact that the Bulletin Board adds an “E” suffix to a firm’s ticker to flag that the firm is delinquent in its SEC reporting. This institutional feature enables us to tighten the link between market quality and SEC reporting, since the ticker suffix is a timely indicator of the firm’s reporting status and tied only to SEC reporting. As an additional test, we compare the estimated market quality effects for firms that subsequently return to compliance with SEC reporting requirements – causing the “E” to be removed – and firms that are eventually forced off the Bulletin Board to the Pink Sheets or the Grey Market (NBB) due to non-compliance. If SEC reporting drives our market quality results, we expect market quality to deteriorate following the addition of the “E” suffix. Also, the effect should be smaller for firms that are only temporarily non-compliant.

Table 5, Panel C, presents the results. The analyses are based on the NASDAQ venue history (period: January 2001 to October 2010) and include firm-month observations from all venues. The regressions are estimated at the firm-month level and include year-month and firm fixed effects. In the first specification, the key variable is *E-Ticker* which is equal to one if a firm's ticker is temporarily suffixed with the letter "E", and zero otherwise. In the second specification, we use dummy variables to separate the effects for firms that are allowed to stay on the BB because they return to compliance with SEC reporting requirements (*E-Ticker BB-to-BB*) and firms that are forced to leave the BB because they never return to compliance (*E-Ticker BB-to-NBB*). We also include trading venue indicators, indicators for SEC filing and manual inclusion status, lagged control variables and price-level controls. Since some of the E-Ticker cases coincide with disclosure changes, we do not impose any additional sample filters in these analyses.

The first specification shows that the coefficient estimate on *E-Ticker* is significantly negative for liquidity and significantly positive for crash risk. Thus, as soon as the ticker indicates delinquency in SEC reporting, market quality declines, i.e., liquidity drops and crash risk increases. The second specification shows that the coefficient estimates on *E-Ticker BB-to-NBB* are larger in magnitude than those on *E-Ticker BB-to-BB*. Thus, the reduction in liquidity and the increase in crash risk are larger for firms that never return to SEC compliance compared to firms that are only temporarily non-compliant. These findings support our interpretation that SEC reporting requirements drive the stock liquidity and crash risk effects reported in Table 5.

In the Internet Appendix, we provide additional analyses to tighten identification and corroborate the interpretation that the results are attributable to SEC filings and manual inclusion. First, we exploit the fact that banks and insurance companies are subject to separate oversight and required to provide disclosures to their respective regulators. We therefore expect SEC filings and

manual inclusion to have smaller market quality effects for financial firms. As reported in section IA.6, our results are in line with this expectation. Also, in section IA.10, we show that the coefficients on *SEC* and *Manual* are robust to more extensive fixed effects structures, further mitigating concerns about omitted variables or unobserved shocks. Such concerns are greater for manual inclusion as this is a firm choice, than for SEC reporting, which is largely imposed on firms (see sections 2.1 and 2.4). We nevertheless acknowledge that selection on unobservables is difficult to address. With this caveat in mind, the analyses in this section show that OTC market quality is higher when firms provide more disclosure, either through SEC filings or through listings in securities manuals.

5.3. State securities laws

In this section, we study whether observed market quality reflects differences in the strength of state securities (or blue sky) laws, which are the least stringent form of disclosure regulation (see bottom row of Figure 2). In contrast to federal securities laws, state securities laws generally rely on merit reviews based on reporting to the regulator instead of a public disclosure doctrine. We therefore expect state securities regulation to have a more indirect effect on market quality, e.g., by encouraging firms to satisfy blue sky laws via the manual exemption and manual disclosure or by screening out firms with investor protection concerns. Our tests examine whether firms headquartered in states with tougher merit reviews enjoy higher liquidity and lower crash risk.

The analyses are based on the NASDAQ venue history and include only observations from the OTC market (BB and NBB) because firms traded on traditional exchanges are exempt from state merit reviews. All regressions are estimated at the firm-month level and include year-month and industry fixed effects. The key variable of interest in these regressions is *Merit review* which is a composite score measuring the strictness of the state's merit reviews, as described in section 3. In a

second specification, we estimate separate coefficients on *Merit review* for states with and without a manual exemption. This model allows us to examine whether merit reviews matter more in states that do not offer a manual exemption. We also include a dummy variable $SoInc \neq SoHqt$ that is equal to one when a firm's state of headquarters is not the same as its state of incorporation, and zero otherwise. Since firms that incorporate outside their home state are probably different (e.g., more sophisticated) than firms that do not, this control variable is intended to capture unobserved firm characteristics (see also Litvak, 2011). We include indicators for SEC filings and manual inclusion as well as the same control variables for firm characteristics as before.

Table 6 reports the results. Starting with liquidity, we find a significantly positive coefficient of 0.049 for *Merit review*. Thus, firms headquartered in states with tougher merit review laws have significantly more liquid stocks. The estimated effect is almost as large as the coefficient estimates for *SEC* and *Manual* in the same regressions (0.059 and 0.069, respectively; not reported in Table 6). The second column shows that the estimated coefficient on *Merit review* is larger in magnitude for firms from states without a manual exemption (0.052 versus 0.039 for firms from states with a manual exemption). This result lines up nicely with the beneficial role of manual exemptions in state securities laws (see section 2.3). Turning to crash risk, however, we find that the coefficient estimates on *Merit review* are insignificant and close to zero in both specifications.

In the Internet Appendix, we provide results based on the same regressions using firm fixed effects (see section IA.7). In this analysis, the coefficients on *Merit review* are identified by firms that move their headquarters to states that differ in the strictness of their merit reviews. We find that the liquidity results become even stronger with firm fixed effects, but the relevant coefficients in the crash risk regressions remain insignificant. Thus, while the results indicate a positive relation

between the strictness of state merit reviews and liquidity, they also suggest that state merit reviews could be ineffective in terms of screening out securities with higher crash risk.

5.4. Pink Sheets information tiers and Caveat Emptor label

In August 2007, the then Pink Sheets LLC introduced tiers and labels differentiating firms by information status as well as flagging firms with a public interest or investor protection concern.²⁵ These designations are monitored by the Pink Sheets and modified when disclosures change. In this section, we examine whether market quality varies across these tiers and information labels.²⁶ We expect market quality to increase for tiers and labels indicating better information provision.

The analyses are based on the PS tier history spanning the period October 2007 to October 2010, and include observations solely from the NBB (i.e., Pink Sheets and Grey Market). All regressions are estimated at the firm-month level and include year-month and either industry or firm fixed effects. We examine effects associated with the information regimes by adding dummy variables for firms in the *Pink No Info*, *Pink Limited Info* and *Pink Current Info* tiers, with Grey Market firms being the omitted category. We also include a dummy variable indicating a *Caveat Emptor* flag. Furthermore, we add an indicator for current SEC filings, an indicator for manual inclusion and the same set of controls as in the previous analyses (except that we do not need venue indicators, given the sample restriction). We drop the months in which a firm's information status changes to mitigate reverse causality concerns.

²⁵ See section 1 in the Appendix for more details.

²⁶ Jiang et al. (2015) examine whether the new labels attract investor attention and affect prices and liquidity. Their analysis is based on three-month windows before and after the introduction of the labels. They find that liquidity improves for Pink Current Information firms and deteriorates for Pink No Information firms. They also find a positive association between announcement abnormal returns and subsequent liquidity changes. Their analysis discards Caveat Emptor firms. Litvak (2009) examines prices around the announcement of the initiative and finds that firms subsequently classified as low information providers have negative abnormal returns, suggesting that investors have some ability to predict how firms will be classified.

Table 7 reports the results. The first set of columns shows that liquidity is positively associated with the Pink Sheet information tiers. Including firm fixed effects, the estimated coefficients suggest that liquidity decreases monotonically from stocks in the *Pink Current Info* tier, to stocks in the *Pink Limited Info* tier, to stocks in the *Pink No Info* tier, and declines further for Grey Market firms. In this specification, firms with a *Caveat Emptor* label are even less liquid than Grey Market stocks, suggesting that investors avoid stocks with this flag.

The second set of columns illustrates that crash risk is negatively associated with the Pink Sheets information tiers. The magnitudes of the estimated coefficients decrease monotonically, indicating a steady reduction in crash risk as information provision improves. With industry fixed effects, *Caveat Emptor* stocks have the highest future crash risk, consistent with the label's purpose. The coefficient estimates are also economically significant. For example, the coefficient estimate on *Pink Current Info* in the liquidity (crash risk) regressions with industry fixed effects is 0.353 (-0.143), corresponding to more than one-half (more than one-fifth) of the standard deviation of 0.656 (0.532) for the liquidity (crash risk) proxy in the regression sample.

We perform additional analyses in the Internet Appendix to tighten identification and corroborate the interpretation that the documented differences in market quality reflect the Pink Sheets information tiers. In section IA.8, we show that the results are confined to non-financial firms. The effects of the information tiers are expected to be weaker or perhaps even non-existent for financial firms, considering that they have to report to their respective regulators (and these filings can be accessed by investors).

In section IA.9, we exploit the strengthening of the Pink Sheets regulatory regime over our sample period through the staggered adoption of four major initiatives. Since these initiatives are set at the market level, they are exogenous to a given firm. Our analysis shows that liquidity

improves and crash risk declines for NBB stocks relative to BB stocks following the adoption of the four regulatory initiatives in the Pink Sheets. By the end of the sample period, NBB stocks have essentially caught up to BB stocks in terms of market quality. As we estimate these effects in the presence of firm fixed effects, they do not simply reflect the decline in the number of BB firms over time. Taken together, the analyses in this section provide evidence that firms in higher Pink Sheets information tiers exhibit superior liquidity and lower crash risk.

5.5. Information regimes and return performance

The previous analyses show that market liquidity and crash risk vary systematically across the OTC information regimes. A natural question is whether these differences in information regimes also result in differential return performance. We assess return performance by estimating alphas for portfolios of stocks in the various information regimes using standard asset pricing models. In each month, we collect stocks belonging to each information regime, and compute equally-weighted and value-weighted returns for the separate portfolios. For instance, we take all Pink Sheets stocks that are non-SEC filers and not covered in a manual and compute the returns for this portfolio in every month. If a stock switches regimes, we drop its return in the transition month when computing the portfolio returns. As in Ang et al. (2013), we estimate a five-factor model including market, size, value, momentum, and liquidity factors.²⁷ In order to account for thin trading, we include three lags of each factor in addition to its contemporaneous value.²⁸

Table 8 reports the alpha estimates for Grey Market and Pink Sheets stocks (NBB) in Panel A, and for Bulletin Board (BB) and NASDAQ Small Cap (SCM) stocks in Panel B. Two conclusions

²⁷ We recognize that these factors are constructed based on exchange-traded rather than OTC stocks. However, our intention is simply to examine (relative) abnormal performance for OTC stocks across information regimes.

²⁸ The models are estimated using log returns given the presence of outliers in discrete returns (see Figure 3). Alphas based on discrete returns yield very similar inferences across information regimes but are less precisely estimated, which is likely due to large positive outliers in the discrete return series.

emerge from this analysis. First, the alphas for BB and NBB stocks suggest severe underperformance for OTC stocks. In contrast, the alphas for SCM stocks are either not significantly different from zero or negative but very small in magnitude. The negative alphas for OTC stocks imply an underperformance of 5% per month. This estimate is consistent with the results shown in Eraker and Ready (2015). The negative alphas are also consistent with the distribution of raw returns for OTC stocks shown in the Internet Appendix IA.2 and in Figure 3.

Second, the alphas are remarkably similar across the OTC information regimes that arise from SEC reporting and manual inclusion. For instance, considering NBB firms that are not covered in a manual, the alphas for SEC filers are very similar to those for non-filers: -4.9% for non-SEC filers versus -5.3% for SEC filers, using equally weighted returns.

Thus, in contrast to our market quality results, the regulatory regimes in the OTC market do not appear to be associated with differential return performance. A potential explanation is that returns and market quality reflect conditions in the OTC market differently. In the presence of short-sale constraints and with many retail investors seeking securities with lottery-like payoffs, as discussed by Ang et al. (2013) and Eraker and Ready (2015), it is difficult for more sophisticated investors to arbitrage OTC stocks.²⁹ In section IA.11 of the Internet Appendix, we show that short selling is indeed very difficult in the OTC market.

Instead, (relatively) sophisticated (retail) investors may simply refrain from trading as the lack of information for OTC stocks becomes more severe. The departure of (more) sophisticated

²⁹ Conrad et al. (2014) find that firms with a high probability of death also have a larger predicted probability of a very large (jackpot) return over the subsequent year. These firms tend to have low and declining institutional ownership and are thus mainly held by retail investors. Since retail investors have skewness preferences (Barberis and Huang, 2008), they are likely to overpay for the chance of a jackpot which, in turn, leads to low expected returns. Furthermore, these low returns are not arbitrated away because jackpot stocks tend to be small and to have low institutional ownership and low analyst coverage, and are therefore hard to arbitrage. This evidence reconciles negative returns and crash risk with the chance of extreme positive payoffs via a ‘limits to arbitrage’ argument. The similarity of alphas across regimes is also consistent with Conrad et al. (2014).

investors from the weaker regimes not only reduces liquidity, but also leaves more room for investors seeking lottery-like payoffs to push prices up, resulting in a higher probability of crashes. Although stocks in the stronger regimes exhibit superior liquidity and lower crash risk, they are still on average overpriced, given the general absence of short selling in the OTC market.

6. Conclusion

In this paper, we analyze a comprehensive sample of over 10,000 U.S. stocks that publicly trade in the OTC market. Many of these issuers are not required to register with the SEC and hence are often referred to as “dark.” However, OTC firms that are exempt from federal securities laws are subject to state securities laws as well as venue-based rules stipulating disclosures, and hence not necessarily dark. It is therefore more appropriate to view the OTC market as a twilight zone of different regulatory and information regimes.

We characterize this twilight zone and the regulatory regimes in the OTC market. We provide novel descriptive statistics on industry, entry, survival, venue changes, and trading activity by OTC venue as well as trading history. OTC firms tend to be small, trade at low prices, have negative average returns and exhibit high return volatilities. We show that a large number of stocks enter the OTC market without an IPO or prior listing in the major markets. However, relatively few of these new OTC firms are able to graduate to the traditional exchanges. Yet, firms tend to survive in the OTC market for extended periods of time, including those delisting from an exchange.

Next, we examine the role of venues and regulatory regimes in market quality using proxies for two aspects of market quality: liquidity and crash risk. We show that OTC firms that provide SEC disclosures, publish information in a recognized securities manual, are headquartered in states with stricter merit reviews, and are in higher-level Pink Sheets information tiers exhibit higher market liquidity and lower crash risk. In short, we find that differences in OTC regulatory and information

regimes map into differences in market quality. This finding suggests that (at least some) investors recognize information and regulatory differences across the OTC regimes and trade (or abstain from trading) accordingly. Thus, our study contributes to a more nuanced understanding of investor behavior in the OTC markets. Theories on information asymmetry and adverse selection continue to hold in the OTC market. We emphasize that this conclusion is not at odds with the findings in Ang et al. (2013) and Eraker and Ready (2015). Their asset pricing results suggest that behavioral biases of retail investors, gradual diffusion of information, and short-selling constraints explain why OTC stocks consistently underperform and display very different return characteristics compared to stocks listed on the traditional exchanges. Our results suggest that some, likely more sophisticated, investors abstain from trading stocks when information problems become severe, a response that is likely reflected in the market quality proxies, in particular, liquidity.

Overall, our study points to an important trade-off facing OTC market regulators aiming to create a viable market for small growth firms while protecting investors. Lowering regulatory requirements reduces the compliance burden for smaller firms, but it also significantly reduces market liquidity and increases crash risk for investors. Additionally, our paper highlights the relevance of state securities laws for the OTC market, including merit reviews, manual exemptions as well as associated securities manual publications. The OTC market is often viewed as dark and unregulated but in fact there are many alternative regimes and a thicket of complicated state regulations. We know very little about the effects of these regimes, which govern the trading of securities that are not covered by federal securities laws. This study is, to our knowledge, the first to provide evidence on how these regimes are related to market liquidity and crash risk.

We conclude with a few cautionary words about the interpretation of our results. Identifying the causal effects of OTC regulatory regimes is difficult. For instance, it is possible that

unobservable changes in firm performance or other economic shocks influence market quality proxies and at the same time are related to trading venues, SEC filing status, manual publication or Pink Sheets tiers. If so, our results could be biased. We exploit several institutional features and provide extensive sensitivity analyses to mitigate such and other concerns about selection, but ultimately we interpret the regression results as associations, rather than causal effects.

Appendix: Additional institutional details

1. Pink Sheets tiers

Starting in 2007, the Pink Sheets (now OTC Markets Group) introduced a tier system for companies whose stock is quoted on its platform (www.otcmarkets.com). All securities are assigned a tier based on their reporting method (SEC Reporting or Alternative Reporting Standard) and disclosure category (Current, Limited or No Information). Each stock's tier is displayed next to the ticker symbol on the Pink Sheets website.

Securities in the highest tier, OTCQX, are required to have a current disclosure status and meet minimum financial qualifications. To be included in this tier, companies undergo a qualitative review by the OTC Markets Group and need to be sponsored by a third-party investment bank, depository bank or securities attorney. Companies are not required to be registered with or reporting to the SEC, but must submit financial information to the Pink Sheets for review and display on their website. In addition, companies must be ongoing operations; i.e., they cannot be shells, blank-check companies or in bankruptcy. Many companies in the OTCQX tier are foreign issuers. As the number of U.S. firms in this tier is very small during our sample period, we do not analyze it separately.

Securities in the next tier, OTCQB, must be current in their disclosure and report to the SEC or a U.S. banking or insurance regulator. This tier was introduced in April 2010 and its requirements were extended in May 2014. By contrast, securities in the OTC Pink tier have no SEC or equivalent reporting requirements, and can even be delinquent in their SEC filings. They are placed in one of three categories based on the amount and timeliness of financial disclosure:

1. Pink Current Information companies have submitted information no older than six months to the OTC Markets data and news service, or have made a filing on the SEC's EDGAR system in the previous six months. This category can include shell companies or development stage companies with few or no operations as well as companies without audited financial statements.
2. Pink Limited Information companies are unwilling or unable to meet OTC Markets' guidelines for providing adequate current information but have submitted some of the information required. These are often firms with financial reporting problems, in distress, or in bankruptcy.
3. Pink No Information companies are unwilling or unable to provide disclosure to the public markets. Firms in this category do not make current information available via the OTC Markets disclosure and news service, or if they do, the available information is older than six months. This category includes defunct firms that have ceased operations as well as "dark" firms.

Companies that are deemed to have a public interest or investor protection concern, for example, due to stock promotion, disruptive corporate actions, or legal proceedings, receive a Caveat Emptor flag.

2. State securities (blue sky) laws

State securities laws predate the 1933 and 1934 Acts. While the latter Acts are based on a disclosure doctrine, state securities laws rely on a merit-based regime.³⁰ In other words, state securities regulators have the authority to examine applications for registration, and to approve only those applications that are “fair” to investors. Over the years, several attempts have been made to create more uniform securities laws across states, via the Uniform Securities Acts (USAs) of 1930, 1956, 1988, and 2002. However, there is still significant variation across blue sky laws, making compliance challenging for issuers whose stock is traded by investors in multiple states.

Recent federal acts have to some extent preempted blue sky laws.³¹ For our purposes, the most important of these is the National Securities Markets Improvement Act (NSMIA) of 1996. This legislation creates a class of securities called “federal covered securities,” which includes securities listed on national exchanges, securities issued by a registered investment company, secondary trading of securities issued by federally registered and SEC reporting companies, as well as securities offered or sold without SEC registrations based on one of the exemptions mentioned in footnote 37. NSMIA prevents states from imposing additional disclosure or “merit” standards on such offerings, requiring registration by qualification of such securities as well as prohibiting or limiting the use of any offering document prepared by or on behalf of any issuer of such securities. However, NSMIA allows states to impose filing requirements for documents filed with the SEC (such as a prospectus and Form D) and states may impose filing fees.

Securities Registration

There are four types of state securities registration: coordination, notification, Small Corporation Offering (SCOR), and qualification.³² Registration by coordination is used for issues that are simultaneously registering under the 1933 Act and in the states where the offering is to be sold. Registration by notification (also called filing) is available for issuers with a class of widely-held equity securities registered under the

³⁰ This section draws primarily on individual states’ blue sky laws as reported by Wolters Kluwer Tax & Accounting’s CCH Intelliconnect. Virtually all states’ blue sky laws originally included a merit review, but the nature of merit review today ranges from the very stringent in states like California and Texas, to a regime which in practice mimics the federal disclosure-based process.

³¹ These include the Private Securities Litigation Reform Act of 1995 (“PSLRA”), the 1998 Securities Litigation Uniform Standards Act (“SLUSA”), the National Securities Markets Improvement Act of 1996 (“NSMIA”), SOX, and the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act (“Dodd-Frank”).

³² Arizona and Ohio allow registration by description while Idaho, Nevada, Oregon, and Rhode Island use the term registration by filing for processes similar to registration by notification.

Exchange Act of 1934 that can provide evidence of meeting certain minimum standards.³³ In both cases, NSMIA essentially usurps the state securities regulator's ability to deny state registration.

Many states also offer securities registration under the SCOR definition.³⁴ These offerings are designed to help small businesses raise capital, and are limited in size to no more than \$1 million. SCOR offerings are exempt from SEC Registration following Rule 504 of Regulation D and the Intrastate offering exemption (Rule 147). Unlike other exemptions under Regulation D (see below), SCOR offerings may be marketed by brokers and selling agents, and there is no limitation on the number of investors. Security offers and sales exempt from SEC registration following Rule 505 (up to \$5 million) and Rule 506 (unlimited) offerings under Regulation D still need to be registered in the states where the investors are located. Most jurisdictions have a simplified process which considers the offer or sale as registered in the state provided the issuer files a copy of the federal Form D with the state regulator.

All jurisdictions except New York have statutes that allow registration of securities by qualification, if none of the other registration types apply.³⁵ When seeking registration by qualification, information similar to the registration requirements under the 1933 Act has to be provided to the state securities regulator. The regulator then decides after conducting a merit review whether or not to make the registration effective.

Costs for securities registration vary widely across states, but the typical state has a fee that is proportional to the value of the securities offered in the state.³⁶ State securities registrations are usually valid for one year, and many states require the issuer to update the offering information (prospectus including financial statements) periodically. As discussed in section 2, information filed with regulators in connection with a state securities registration is typically not made publicly available in the way SEC filings are made available on EDGAR.

Secondary Trading and Exemptions

As long as the state securities registration is effective, secondary trading of the security is allowed provided the trades involve only residents of states where the security is registered. In addition, most states

³³ Eligibility requirements for registration by notification/filing are: that the SEC registered securities are held by more than 500 persons on record; that the issuer has a net worth of more than \$4 million or a pre-tax net income of more than \$2 million for two out of the three fiscal years preceding the offering; that the issuer has actively engaged in business operations for 36 consecutive months preceding the offering; that at least four market makers have been quoting the SEC registered securities for at least 30 days out of the three months preceding the offering; that the underwriter commissions will not exceed 10% of the offering; that neither the issuer nor any of its subsidiaries have failed to pay a preferred stock dividend or defaulted on any bond or long-term lease; and that the price of the offered security is no less than \$5.00.

³⁴ Further information on SCOR requirements and applicable laws can be found at www.nasaa.org/industry-resource/corporation-finance/scor-overview.

³⁵ This type of registration is used by states for Rule 144A offerings, Regulation A offerings, Intrastate offerings larger than \$1 million (Rule 147), and offerings to accredited investors.

³⁶ Typically, the rule is 1/10 of 1% or 1/20 of 1%. Note that there are some states with flat fees, and others with no maximum fee. The average across states is a minimum fee of \$390 and a maximum of \$2,525.

require firms to register in the state in which their headquarters are based (home state registration). An issuer has to renew its state registration(s) in order for secondary trading to continue beyond one year.

The requirement to maintain effective registrations in multiple states is costly, and issuers may therefore seek to qualify for one of the exemptions to state securities registration. In addition to federal covered securities, many states exempt, for example, bank stocks, savings & loans, insurance companies, credit unions, and public utilities from registration provided that the issuers are regulated by federal and/or state laws. USA 2002 also includes twelve exemptions for transactions in securities, and seven of these exemptions directly address equity trading.³⁷ However, the adoption of the USA 2002 exemptions varies significantly across states.

One way for a firm to obtain an exemption from registering the securities in each state where investors may reside is to list the firm in a nationally recognized securities manual. The most prominent manuals are Mergent's (previously Moody's) Manual and the Standard & Poor's Corporation Records. These two manuals are explicitly recognized in 41 jurisdictions (including the District of Columbia) and one state recognizes Fitch's manual. To be covered in Mergent's Manual, for instance, the firm currently pays an initial listing fee of \$4,700 and an annual renewal fee of \$1,100.

The manuals contain a company profile which includes the company history, business description, subsidiaries, plant & property, and management listing. The manuals also include financials: income accounts for the most recent 3 years, balance sheets for the last 2 years, as well as a description of the capital stock. If available, company information is provided, including contact information, website, annual meeting date, counsel, auditors, long-term debt, number of shareholders, transfer agent, shareholder relations contact, five-year stock pricing range, and the number of employees.

The manuals are available in print and online for industry professionals and major research libraries. Once a firm is listed in a recognized manual, investors from most states can freely trade unregistered shares on the secondary market.³⁸ Thus, a manual listing significantly enhances information disclosures to potential investors and enlarges the pool of investors for which secondary trading would be permitted.

³⁷ The USA 2002 exemptions relevant for transactions in securities are: (1) isolated non-issuer transactions, (2) securities listed in a recognized manual, (3) unsolicited orders, (4) transactions involving institutional investors/financial institutions, (5) limited offerings, (6) existing security holders, and (7) transactions involving securities registered under the 1933 Act. USA 2002 exemptions with the most common adoptions are the limited offering exemption (51 jurisdictions), the institutional investor/financial institution exemption (45 jurisdictions), and the manual exemption (42 jurisdictions).

³⁸ Exceptions are Alabama, California, Illinois, Kentucky, Louisiana, New York, Pennsylvania, Tennessee, and Virginia.

3. State corporate laws

State corporate laws may also contain financial reporting requirements that are relevant to firms not subject to federal laws. Companies are free to incorporate in the state of their choice, no matter where their headquarters or operations, and approximately 50% of U.S. firms have chosen to incorporate in Delaware. The Model Business Corporation Act (MBCA), which is the basis for corporate laws in 24 states, describes reporting requirements and penalties. According to the MBCA, firms are required to provide annual financial statements to shareholders within 120 days of the end of the fiscal year. If a shareholder is not mailed financial statements and submits a written request, these statements must be mailed. However, several states (e.g., California, New York, and Delaware) do not follow the MBCA.

According to the American Bar Association (2002), 15 states require the automatic provision of annual reports and 26 states require companies to furnish an annual report only upon receipt of a written shareholder request. The other states do not require annual financial statements to be furnished. Of the states with some reporting requirements, 16 states require financials to be mailed within 120 days of the fiscal year end, while a few states give companies 180 days after the fiscal year end or “a reasonable time” following the receipt of a request. Several states impose penalties such as fines or the right to legal costs or remedies, if the firm fails to deliver the financial statements.

However, while state corporation laws sometimes require firms to provide financial statements to shareholders, these laws apply at the level of the record holder and hence, to our understanding, do not necessarily lead to disclosure to beneficial owners or prospective shareholders. For this reason, the effect of financial reporting mandated by state corporation laws on liquidity and crash risk is not clear.

We investigate the associations using the American Bar Association’s (2002) description of reporting requirements. We define states as having weak (10), medium (26), and strong (15) financial reporting requirements, and assign firms to each category based on their state of incorporation. We run the same regression model used to evaluate state securities laws (Table 6). Overall, the results (untabulated) are inconclusive. In the base specification with industry fixed effects, firms incorporated in a state with strong state corporate law reporting requirements do not exhibit higher liquidity, although firms do have significantly lower crash risk when incorporated in states with medium and strong requirements. When we add firm fixed effects, the positive association with liquidity becomes stronger, but the crash risk associations are now weaker and insignificant. However, relatively few OTC firms change their state of incorporation over the sample period and hence can contribute to the identification of state corporate law effects. We therefore also run specifications excluding Delaware and Nevada, the two most commonly chosen states of incorporation, as well as including a binary indicator for out-of-state incorporation. These two choices should mitigate concerns about self-selection. The results remain mixed. Hence, we conclude that there are

no reliable associations between the reporting requirements embedded in state corporate laws and the two market quality proxies, potentially reflecting the fact that these financial reports are generally not furnished to beneficial owners.

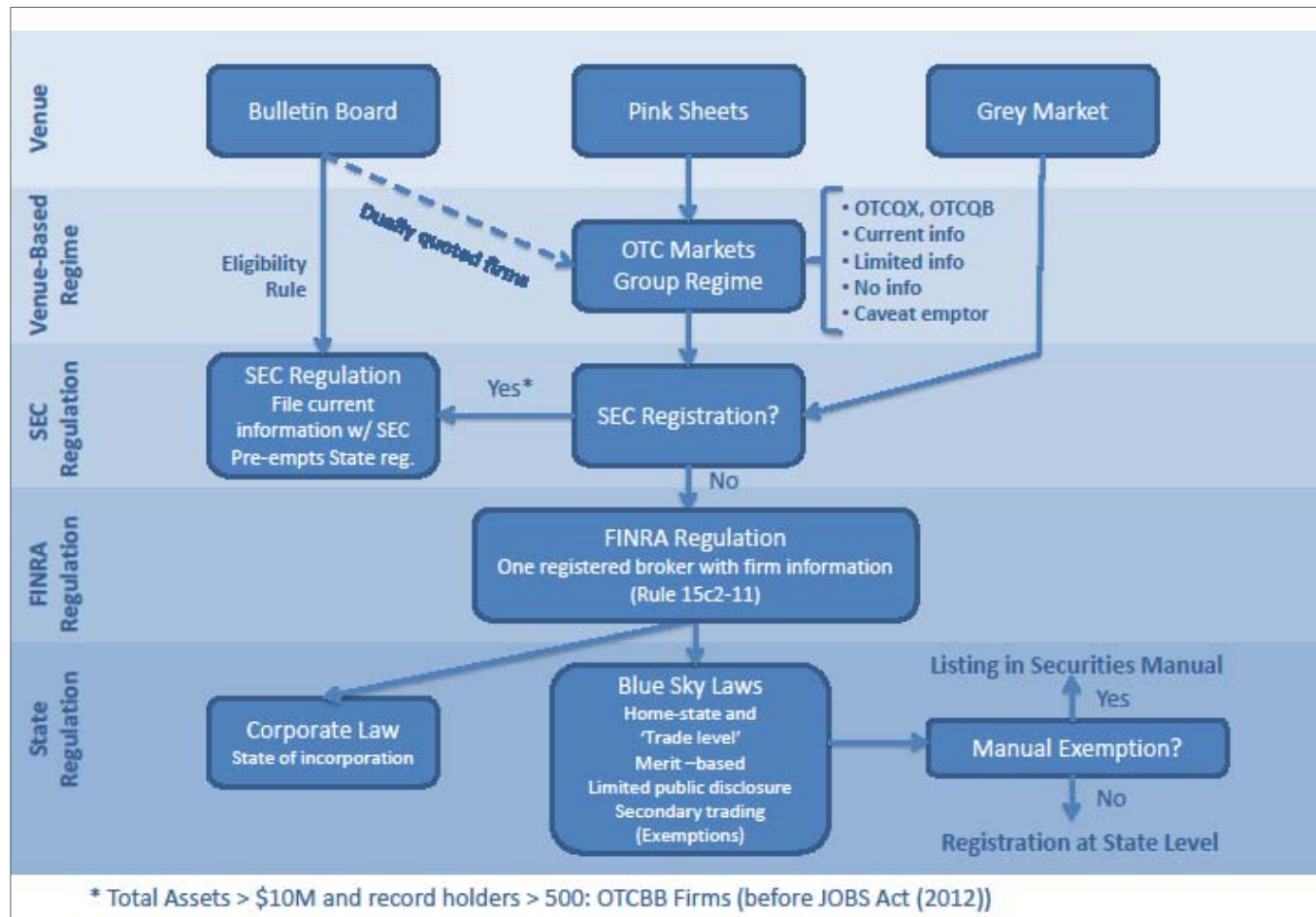
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Figure 1
Regulatory regimes in U.S. OTC markets



This figure schematically summarizes the regulatory regimes in U.S. OTC markets.

Figure 2

Regulatory and disclosure regimes in U.S. capital markets

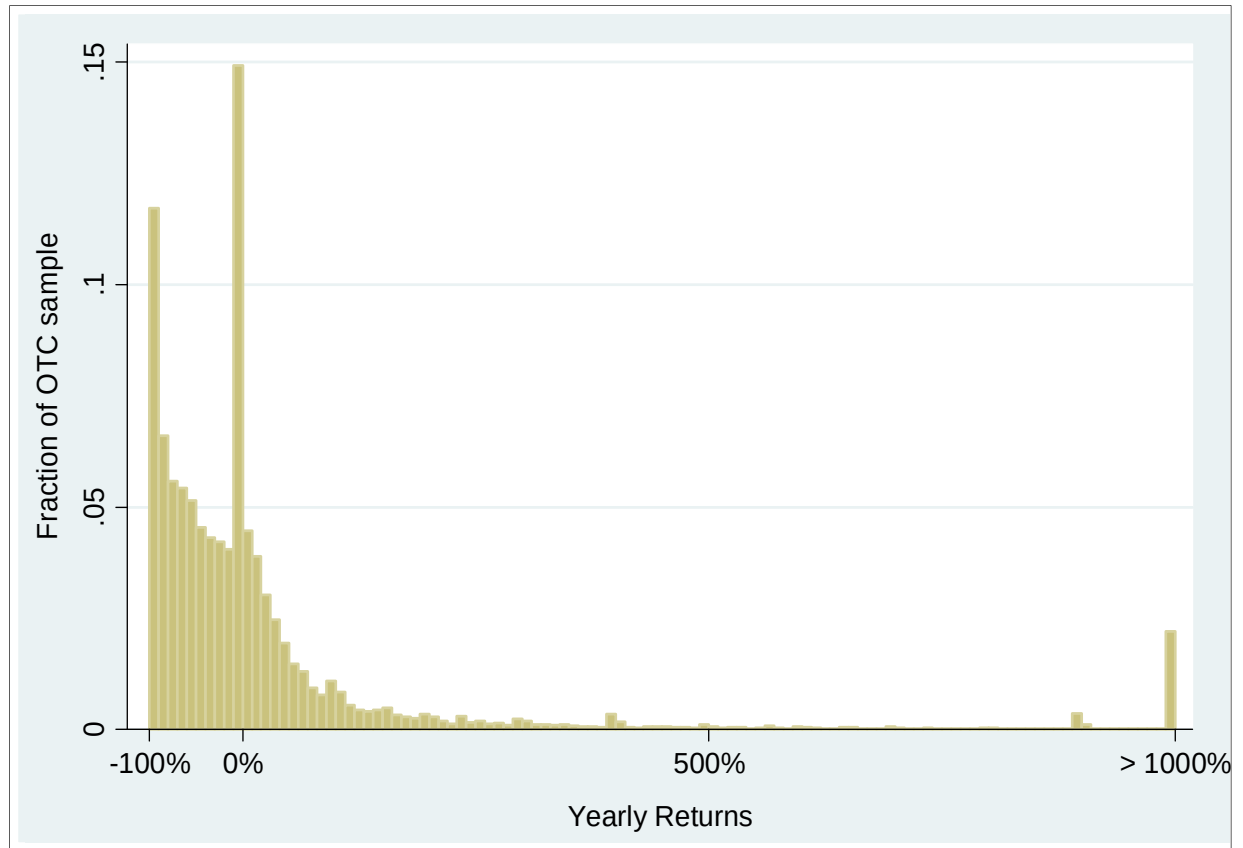
Regulatory and Disclosure Regimes							
Disclosure Regime	Trading Venue						
	Exchange (incl. SCM)	Bulletin Board	Pink Sheets		Grey Market		
				SEC Thresholds		SEC Thresholds	
				>	<	>	<
SEC	M	M	PS tiers	M		M	
Manual	V	V		V		V	
State Securities Law	PE	PE		PE	M	PE	M

More Disclosure ↑

← Stricter Venue Regulation

This figure summarizes the regulatory and disclosure regimes in U.S. capital markets. The hierarchy of markets, going from the most to the least regulated, is: Exchange (i.e., traditional non-OTC markets including the NASDAQ Small Cap Market or SCM); the Bulletin Board (BB); the Pink Sheets (PS); and the Grey Market (GM). The disclosure regimes, going from mandatory disclosure (denoted M) to voluntary disclosure (denoted V), are: SEC reporting (SEC) mandated by trading venue; SEC reporting for issuers above the thresholds on total assets (\$10M) and shareholders (500) that trigger automatic SEC reporting obligations; voluntary appearance in a securities manual (Manual); and State Securities Laws. Within the Pink Sheets, there are PS regimes which include initiatives undertaken by its operator, the OTC Markets Group: the introduction of PS information tiers (OTCQX, OTCQB, and OTC Pink) as well as the move to greater transparency in pricing. Over our sample period, SEC filing has been mandatory for Exchange, SCM and BB firms (denoted M). PS and GM firms are not required to file with the SEC unless they exceed the above asset or shareholder thresholds, but they may do so voluntarily. State securities laws apply in every state where the firm sells its shares, as well as in the states of both buyer and seller. Finally, state securities regulation is pre-empted (denoted PE) in two instances: if issuers are registered with the SEC; or if their securities trade in one of 42 states where issuers are exempt from state registration requirements if they are included in “a nationally recognized securities manual” such as Mergent’s Manuals and Standard & Poor’s Corporation Records.

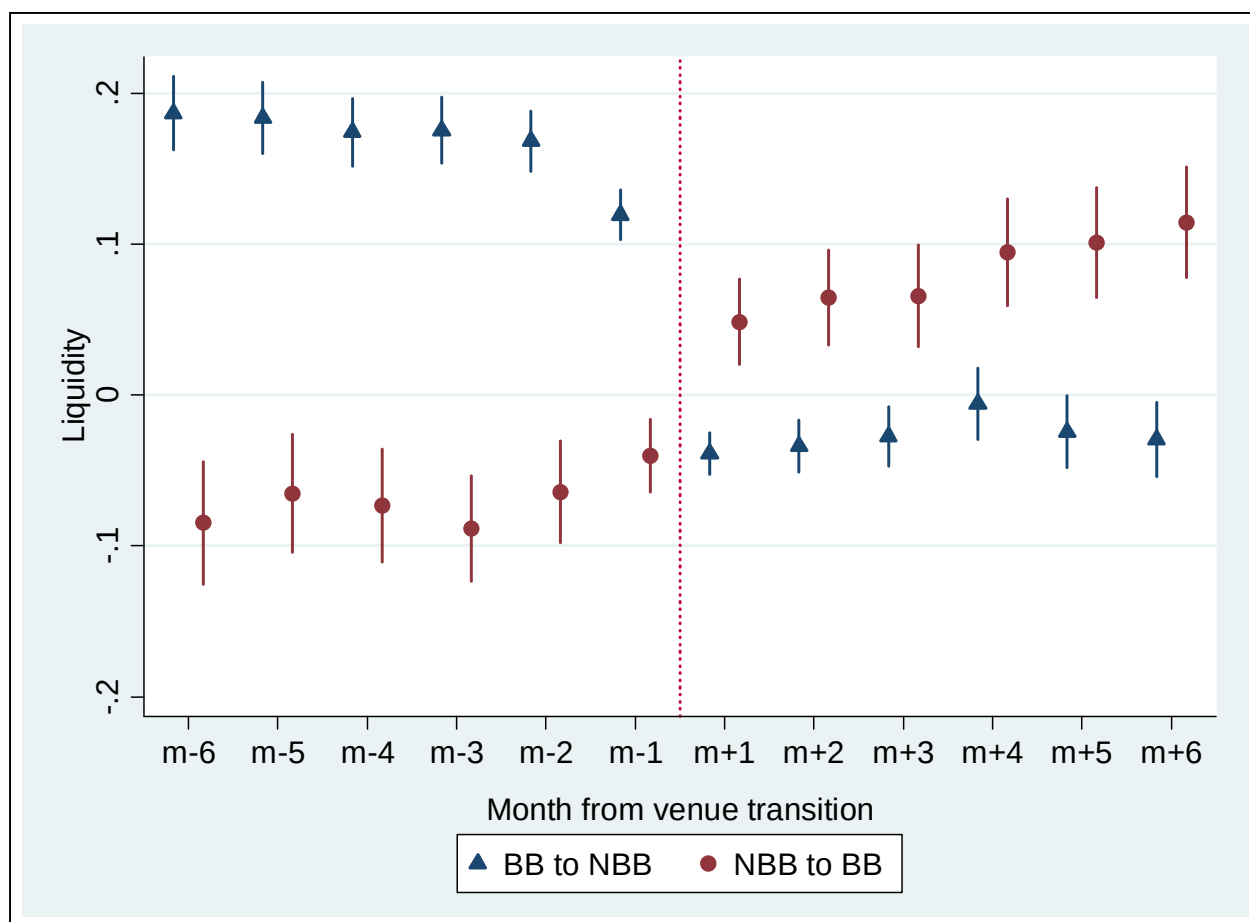
Figure 3
Stock returns in the OTC sample



This figure presents a histogram of the distribution of yearly discrete stock returns for all firm-years in the OTC sample (i.e., firms from the NASDAQ SCM benchmark group are excluded). The rightmost bar comprises firm-years with returns equal to or higher than 1000%.

Figure 4

Liquidity changes around trading venue transitions



This figure summarizes the key results from regression analyses of liquidity changes around trading venue transitions between the OTC Bulletin Board (BB) and the NBB (i.e., Pink Sheets or Grey Market). The figure plots the coefficient estimates, together with upper and lower 95% confidence values, on the transition indicators in a 13-month window centered on the transition month (m). The regression models are estimated at the firm-month level and include indicators for each of the 6 months before and the 6 months after the transition (i.e., the transition month, m , is the omitted category), year-month and transition fixed effects, indicators for SEC filing and manual inclusion status, lagged control variables and price-level controls. The standard errors are clustered by firm. The samples underlying the figure consist of 821 transitions from the NBB (Pink Sheets or Grey Market) to the BB (Bulletin Board), and 2,573 transitions from the BB to the NBB. We exclude transitions for firms that switch venues multiple times during the window. For further details on this analysis, see section IA.5 in the Internet Appendix.

Table 1*Sample selection and sample group classification***Panel A: Sample selection**

Sample selection steps	# Firms
Match NASDAQ venue history - Datastream	16,965
- Firms incorporated outside the U.S.	4,140
- REITs	91
- Firms with DS time series < 50 days	603
- Rarely traded firms	1,328
- OTC not main venue	296
Final sample (Jan 2001- Oct 2010)	10,507

Panel B: Sample group classification

Sample group	# Firms	Fraction
In OTC only (start in 2001)	4,898	48%
New firms (remain in OTC)	2,782	27%
Comeback firms (remain in OTC)	270	3%
Rising stars (start in 2001)	367	4%
Rising stars (new firms)	192	2%
Rising stars (comeback firms)	71	1%
Fallen angels (from exchange)	1,714	17%
Total OTC	10,294	100%
Benchmark: NASDAQ SCM	213	
Total Sample	10,507	

Panel C: Dark firms across sample groups

Sample group	Dark firms	SEC at some point during sample period		Manual at some point during sample period	
	# Firms	# Firms	Fraction SEC filing while in OTC	# Firms	Fraction Manual inclusion while in OTC
In OTC only (start in 2001)	1,382	3,413	59%	2,065	24%
New firms (remain in OTC)	683	2,064	81%	837	16%
Comeback firms (remain in OTC)	6	263	77%	147	27%
Rising stars (start in 2001)	0	367	88%	307	31%
Rising stars (new firms)	0	192	87%	164	25%
Rising stars (comeback firms)	0	71	84%	54	32%
Fallen angels (from exchange)	0	1,714	43%	1,551	39%
Total OTC	2,071	8,084	62%	5,125	25%
Benchmark: NASDAQ SCM	0	213	-	203	-
Total Sample	2,071	8,297	-	5,328	-

Table 1 (continued)

This table describes the sample selection process (Panel A) and the sample composition (Panels B and C). The sample is based on a proprietary dataset provided by NASDAQ that includes the venue history of all equity securities that are traded in the OTC market (i.e., the Bulletin Board, the Pink Sheets or the Grey Market) or the NASDAQ Small Cap Market (SCM) at some point during the period January 2001 through October 2010. Matching this dataset with capital market data from Datastream results in an initial sample of 16,965 firms. We eliminate firms that are incorporated outside the U.S., Real Estate Investment Trusts (REITs), firms with short capital market histories (i.e., Datastream provides data for less than 50 trading days), firms whose securities trade rarely (i.e., less than five trading days in total and/or no stock price changes throughout) and firms for which the OTC market is not the main trading venue for their securities. The final sample comprises 10,507 firms. The sample groups in Panels B and C are defined as follows: *In OTC only (start in 2001)* includes firms that trade in the OTC market throughout the sample period, i.e. from January 2001 onwards. *New firms (remain in OTC)* comprises firms that trade in the OTC market throughout, but enter the sample as new firms after January 2001. *Comeback firms (remain in OTC)* enter the sample after January 2001 and remain in the OTC market throughout, but have a filing history with the SEC before January 2001. *Rising stars (start in 2001)* are firms that are in the OTC market as of January 2001 but subsequently trade up to the traditional exchanges (AMEX, NASDAQ or the NYSE) or the NASDAQ Small Cap market. *Rising stars (new firms)* enter the sample after January 2001 as OTC firms and later trade up. *Rising stars (comeback firms)* enter the sample after January 2001 as OTC firms and later trade up, but have a filing history with the SEC before January 2001. *Fallen angels (from exchange)* are firms that enter the sample by delisting from the traditional exchanges and trading down to the OTC market (in or after January 2001). *NASDAQ SCM* is a benchmark group comprising firms that remain on the NASDAQ Small Cap market throughout the sample period. In Panel C, we define dark firms as firms that never file with the SEC and are never included in securities manuals (Mergent's Manual or the Standard & Poor's Corporation Records) during our sample period. The fractions within the OTC are computed by dividing the number of OTC firm-months with SEC filings or with inclusion in securities manuals by the total number of OTC firm-months.

Table 2*Survival statistics and trading venue transitions***Panel A: Firm entries and exits**

Sample group	# Firms	Start in sample		End in sample	
		= Jan 2001	> Jan 2001	< Oct 2010	= Oct 2010
In OTC only (start in 2001)	4,898	4,898	0	1,574	3,324
New firms (remain in OTC)	2,782	0	2,782	345	2,437
Comeback firms (remain in OTC)	270	0	270	48	222
Rising stars (start in 2001)	367	367	0	73	294
Rising stars (new firms)	192	0	192	31	161
Rising stars (comeback firms)	71	0	71	22	49
Fallen angels (from exchange)	1,714	1,574	140	743	971
Total OTC	10,294	6,839	3,455	2,836	7,458
Benchmark: NASDAQ SCM	213	172	41	104	109

Panel B: Trading venue transitions across years

Venue	Sample: existing in 2001		Sample: existing in 2003		Sample: existing in 2005	
	2001	2006	2003	2008	2005	2010
NBB	2,641 100%	2,136 81%	3,697 100%	2,857 77%	4,537 100%	2,917 64%
BB		300 11%		281 8%		231 5%
SCM/Exchange		29 1%		46 1%		45 1%
Removed		176 7%		513 14%		1,344 30%
NBB		1,089 38%		925 33%		965 37%
BB	2,896 100%	1,227 42%	2,807 100%	1,255 45%	2,638 100%	1,106 42%
SCM/Exchange		200 7%		231 8%		166 6%
Removed		380 13%		396 14%		401 15%

Panel C: Firm survival and crashes across years

Status	Sample: existing in 2001		Sample: existing in 2003		Sample: existing in 2005	
	2001	2006	2003	2008	2005	2010
NBB	2,506 100%		2,301 100%		2,798 100%	
Alive		1,521 61%		1,561 68%		1,468 52%
Crash		822 33%		436 19%		711 25%
Removed		163 7%		304 13%		619 22%
BB	2,882 100%		2,713 100%		2,514 100%	
Alive		1,882 65%		1,949 72%		1,632 65%
Crash		621 22%		376 14%		499 20%
Removed		379 13%		388 14%		383 15%

This table presents statistics on survival and trading venue transitions. Panel A illustrates how many firms enter the sample at or after the beginning of the sample period (January 2001) and how many firms leave the sample at the end of the sample period (October 2010), or leave beforehand. These statistics are presented by sample group. For

Table 2 (continued)

details on the sample group composition, see Table 1. Panel B shows 5-year venue transition matrices for firms that are part of the sample in 2001, 2003 and 2005. The matrices illustrate whether and how the trading venue changes over the subsequent five years. *NBB* includes both Pink Sheets and Grey Market firms. *BB* refers to firms on the Bulletin Board. *SCM/Exchange* comprises firms listed on the NASDAQ Small Cap market or on the traditional exchanges (AMEX, NASDAQ or the NYSE). *Removed* refers to firms that are no longer traded on any exchange or venue (including the OTC market). Panel C presents survival statistics for firms that are part of the sample in 2001, 2003 and 2005, and have not crashed previously. *Crash* covers firms that (i) experience a yearly proportional return of -95% or below at some point during the five-year window and (ii) subsequently have a stock price below \$0.01 for at least six months. *Alive* comprises firms that do not belong to the categories *Removed* or *Crash*.

Table 3*Descriptive statistics on market quality proxies***Panel A: Liquidity (t)**

Venue	# Firms months	Mean	StDev	P25	P50	P75
NBB Missing	141,726	-0.3714	0.4663	-0.6123	-0.5555	-0.3487
NBB Grey Market	19,901	-0.5001	0.2936	-0.6123	-0.6117	-0.5408
NBB Pink Sheets	151,200	-0.2608	0.5178	-0.6059	-0.4689	-0.1283
BB	293,597	0.0606	0.6159	-0.4149	-0.0655	0.3822
Total OTC	606,424	-0.1389	0.5865	-0.5744	-0.3554	0.1329
SCM (Benchmark or to/from OTC)	39,089	0.5731	0.6506	0.1625	0.5066	0.7940
Exchange (to/from OTC)	66,451	0.9129	0.7188	0.5071	0.7570	1.1638

Panel A1: Proportion of zero return days (t)

Venue	# Firms months	Mean	StDev	P25	P50	P75
NBB Missing	141,726	0.8690	0.2121	0.8421	0.9545	1.0000
NBB Grey Market	19,901	0.9323	0.1534	0.9500	1.0000	1.0000
NBB Pink Sheets	151,200	0.7990	0.2474	0.6842	0.9048	1.0000
BB	293,597	0.5785	0.3009	0.3158	0.6000	0.8571
Total OTC	606,424	0.7130	0.2971	0.4783	0.8182	1.0000
SCM (Benchmark or to/from OTC)	39,089	0.2622	0.2357	0.0526	0.1905	0.4211
Exchange (to/from OTC)	66,451	0.1414	0.1815	0.0000	0.0870	0.1905

Panel A2: Share turnover (t)

Venue	# Firms months	Mean	StDev	P25	P50	P75
NBB Missing	141,726	0.0737	0.2527	0.0000	0.0035	0.0344
NBB Grey Market	19,901	0.0275	0.1514	0.0000	0.0002	0.0056
NBB Pink Sheets	151,200	0.0976	0.2700	0.0013	0.0143	0.0682
BB	293,597	0.1493	0.3149	0.0093	0.0426	0.1416
Total OTC	606,424	0.1147	0.2883	0.0016	0.0200	0.0921
SCM (Benchmark or to/from OTC)	39,089	0.2679	0.4207	0.0441	0.1123	0.2888
Exchange (to/from OTC)	66,451	0.4368	0.5279	0.0953	0.2358	0.5604

Panel B: Crash risk (t to t+2)

Venue	# Firms months	Mean	StDev	P25	P50	P75
NBB Missing	81,566	0.0863	0.6880	-0.2593	-0.1054	0.5051
NBB Grey Market	5,969	0.1532	0.8245	-0.3032	-0.0929	0.8346
NBB Pink Sheets	107,642	0.0543	0.6026	-0.2272	-0.1093	0.2025
BB	249,569	-0.0467	0.4090	-0.2033	-0.1252	-0.0391
Total OTC	444,746	0.0048	0.5304	-0.2139	-0.1171	0.0248
SCM (Benchmark or to/from OTC)	33,999	-0.1293	0.2008	-0.1981	-0.1364	-0.0825
Exchange (to/from OTC)	57,476	-0.0996	0.2424	-0.1887	-0.1315	-0.0755

Table 3 (continued)

Panel B1: Negative skewness of returns (t to t+2)

Venue	# Firms months	Mean	StDev	P25	P50	P75
NBB Missing	81,566	0.2550	4.0851	-1.3461	0.0099	1.9112
NBB Grey Market	5,969	-0.0523	4.6030	-1.7575	0.0228	1.6099
NBB Pink Sheets	107,642	0.2350	3.5343	-1.0643	-0.0084	1.2766
BB	249,569	-0.1378	2.2408	-0.8394	-0.1512	0.4733
Total OTC	444,746	0.0256	3.0366	-0.9389	-0.0868	0.7442
SCM (Benchmark or to/from OTC)	33,999	-0.3054	1.2125	-0.7762	-0.2221	0.2535
Exchange (to/from OTC)	57,476	-0.1653	1.2062	-0.6955	-0.1836	0.2988

Panel B2: Cumulative log-return less than -95% (t to t+2)

Venue	# Firms months	Mean	StDev
NBB Missing	81,566	0.1600	0.3666
NBB Grey Market	5,969	0.2545	0.4356
NBB Pink Sheets	107,642	0.1321	0.3386
BB	249,569	0.0761	0.2651
Total OTC	444,746	0.1074	0.3096
SCM (Benchmark or to/from OTC)	33,999	0.0161	0.1259
Exchange (to/from OTC)	57,476	0.0294	0.1690

This table presents descriptive statistics on our market quality proxies by trading venue at the firm-month level. We use two proxies: liquidity (Panel A) and crash risk (Panel B). *Liquidity* is the first principal factor of the proportion of zero return days and share turnover, both measured over the current month (t). The *proportion of zero return days* is the fraction of trading days in a given month with zero returns (Panel A1). *Share turnover* is the average number of shares traded per day divided by the average number of shares outstanding in a given month (Panel A2). *Crash risk* is the first principal factor of the negative skewness of returns and a dummy variable capturing large negative returns, both measured over rolling three-month windows that include the current month and two subsequent months (t to t+2). The *negative skewness* of returns is the negative coefficient of skewness, i.e. the negative of the third moment of daily log returns divided by the standard deviation of daily log returns raised to the third power (Panel B1). The dummy variable is also based on daily log returns and indicates a *cumulative return less than -95%* over the three-month window (Panel B2). *NBB* includes both Grey Market and Pink Sheets firms. A proprietary dataset provided by the OTC Markets Group (the PS venue history) allows us to identify these subsamples. The remaining firms for which this separation is not possible are flagged as *NBB Missing*. *BB* refers to firms on the Bulletin Board. *SCM* indicates firms on the NASDAQ Small Cap market and comprises firms in the benchmark group (see Table 1) as well as firms that come from or switch to the OTC market. *Exchange* captures firms listed on the traditional exchanges (AMEX, NASDAQ or the NYSE) that come from or switch to the OTC market. For consistency with the regression analysis reported in Table 4 (based on the NASDAQ venue history), we apply the same filters: for liquidity, we exclude months in which firms change trading venues; for crash risk, the month of, and the six months before, venue changes are excluded.

Table 4*Regression analysis: Trading venues***Panel A: Liquidity (t)**

Independent variables	Dependent variable: Liquidity (t)			
	NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010	
Trading venue indicators				
Pink Sheets			0.095*** (7.31)	0.127*** (7.41)
BB	0.236*** (28.88)	0.247*** (32.71)	0.287*** (17.88)	0.317*** (16.86)
SCM (Benchmark or to/from OTC)	0.793*** (50.55)	0.686*** (46.27)	0.952*** (37.09)	0.810*** (31.06)
Exchange (to/from OTC)	0.997*** (67.51)	0.706*** (54.56)	1.100*** (48.65)	0.797*** (34.68)
Control variables (lagged)				
Log(Market value)	0.103*** (47.64)	0.074*** (35.74)	0.118*** (44.18)	0.070*** (26.39)
Return volatility	0.110*** (14.52)	0.045*** (7.89)	0.111*** (10.51)	0.051*** (6.53)
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	711,964	711,964	427,541	427,541
R-squared	0.40	0.62	0.41	0.64

Table 4 (continued)**Panel B: Crash risk (t to t+2)**

Independent variables	Dependent variable: Crash risk (t to t+2)			
	NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010	
Trading venue indicators				
Pink Sheets			-0.063*** (-3.08)	-0.114*** (-4.83)
BB	-0.101*** (-23.16)	-0.164*** (-28.31)	-0.150*** (-7.11)	-0.250*** (-10.26)
SCM (Benchmark or to/from OTC)	-0.148*** (-25.91)	-0.221*** (-24.62)	-0.198*** (-9.01)	-0.310*** (-11.92)
Exchange (to/from OTC)	-0.133*** (-22.30)	-0.243*** (-29.44)	-0.188*** (-8.56)	-0.320*** (-12.65)
Control variables (lagged)				
Log(Market value)	0.012*** (11.35)	0.052*** (32.41)	0.011*** (8.58)	0.054*** (26.46)
Return volatility	0.279*** (33.24)	0.123*** (13.16)	0.244*** (23.12)	0.102*** (8.80)
Cumulative return	0.063*** (32.96)	0.092*** (47.83)	0.063*** (26.45)	0.092*** (39.17)
Share turnover	0.015*** (5.56)	0.008** (2.44)	0.014*** (4.24)	0.005 (1.44)
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	536,221	536,221	331,599	331,599
R-squared	0.07	0.16	0.06	0.16

Table 4 (continued)

This table presents regression analyses relating liquidity (Panel A) and crash risk (Panel B) to the trading venues of the sample firms. For details on the proxies for liquidity (t) and crash risk (t to $t+2$), see Table 3. All regressions are estimated at the firm-month level and include year-month and either industry or firm fixed effects. The first two specifications in each panel are based on the full sample as described in Table 1 (NASDAQ venue history; period: January 2001 to October 2010), and include the following trading venue indicators: *BB* (firms traded on the Bulletin Board), *SCM* (firms on the NASDAQ Small Cap market) and *Exchange* (firms listed on AMEX, NASDAQ or the NYSE), with NBB firms (firms traded in the Pink Sheets or the Grey Market) being the omitted category. The third and fourth specifications exploit the PS venue history as described in Table 3 (period: February 2003 to October 2010), and refine the analysis by including an additional venue dummy for *Pink Sheets* firms, with Grey Market firms being the omitted category. We include the following lagged control variables: *Log(Market value)* is the natural logarithm of the median of the daily closing market value over the previous three months ($t-3$ to $t-1$); *Return volatility* is the standard deviation of weekly log returns over the previous six months ($t-6$ to $t-1$); *Cumulative return* is the cumulative log return over the previous three months ($t-3$ to $t-1$); and *Share turnover* is the average number of shares traded per day divided by the average number of shares outstanding over the previous three months ($t-3$ to $t-1$). We also include, but do not report the coefficients on, three price-level dummy variables that indicate whether the median of the daily closing stock price over the previous three months ($t-3$ to $t-1$) is below \$0.01, \$0.10 or \$1.00. The analyses are subject to the following transition filters: for the liquidity regressions, we exclude months in which firms change trading venues; for the crash risk regressions, the month of, and the six months before, venue changes are excluded. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

Table 5*Regression analysis: SEC filings and manual inclusions***Panel A: Liquidity (t)**

Independent variables	Dependent variable: Liquidity (t)			
	All venues		NBB only	
Manual	0.051*** (7.17)	0.057*** (9.71)	0.111*** (10.15)	0.091*** (12.24)
SEC	0.042*** (4.17)	0.049*** (6.39)	0.061*** (5.88)	0.047*** (6.23)
Trading venue indicators	Yes	Yes		
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	700,744	700,744	305,963	305,963
R-squared	0.40	0.62	0.14	0.50
Prop. matched sample				
Manual	0.044*** (5.80)	0.040*** (5.89)		
SEC			0.025** (2.17)	0.020* (1.79)

Table 5 (continued)**Panel B: Crash risk (t to t+2)**

Independent variables	Dependent variable: Crash risk (t to t+2)			
	All venues		NBB only	
Manual	-0.030*** (-11.54)	-0.004 (-1.01)	-0.051*** (-5.59)	-0.016 (-1.41)
SEC	-0.049*** (-6.70)	-0.071*** (-8.43)	-0.039*** (-4.75)	-0.070*** (-5.86)
Trading venue indicators	Yes	Yes		
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	491,328	491,328	174,337	174,337
R-squared	0.07	0.16	0.07	0.20
Prop. matched sample				
Manual	-0.023*** (-8.41)	0.001 (0.28)		
SEC			-0.049*** (-5.15)	-0.067*** (-3.51)

Table 5 (continued)**Panel C: E-Ticker analysis**

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
[1] E-Ticker	-0.035*** (-5.86)		0.123*** (21.27)	
[2a] E-Ticker BB-to-BB	-0.027*** (-3.67)		0.020*** (3.45)	
[2b] E-Ticker BB-to-NBB	-0.049*** (-5.27)		0.311*** (28.00)	
[2a] - [2b] = 0 [p-value]	[0.06]		[<0.01]	
Trading venue indicators	Yes	Yes	Yes	Yes
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	719,859	719,859	582,030	582,030
R-squared	0.62	0.62	0.15	0.16

This table presents regression analyses relating liquidity (Panel A) and crash risk (Panel B) to the SEC filing and manual inclusion status of the sample firms. Panel C presents regression analyses relating liquidity and crash risk to delinquency in SEC reporting on the Bulletin Board. For details on the proxies for liquidity (t) and crash risk (t to t+2), see Table 3. In Panels A and B, all regressions are estimated at the firm-month level and include year-month and either industry or firm fixed effects. The analyses are based on the NASDAQ venue history (period: January 2001 to October 2010) and include firm-month observations either from all venues or from the NBB only (Pink Sheets and Grey Market). *SEC* is a dummy variable equal to one for firms that file 10-Ks and 10-Qs with the SEC, and zero otherwise. All firms outside the NBB are defined as SEC registrants, that is, *SEC* equals zero only for firms in the Pink Sheets or the Grey Market that do not file with the SEC. *Manual* is a dummy variable equal to one for firms that are included in either Mergent's Manual or the Standard & Poor's Corporation Records in a given year, and zero otherwise. We also include, but do not report the coefficients on, trading venue indicators, lagged control variables and price-level controls (see Table 4 for details). The analyses are subject to the following filters: for the liquidity regressions, we exclude months in which firms change their SEC filing and/or manual inclusion status; for the crash risk regressions, the month of, and the six months before, such changes are excluded. The upper (lower) part of each panel reports regression results based on the full sample (a propensity-matched sample). In the propensity matched regressions based on observations from all venues, we match on *Manual* using *SEC* and the other control variables (lagged market value, lagged return volatility, lagged stock price and dummy variables for industry, state of headquarters and half-years) as matching variables. In the propensity matched regressions based on observations from the NBB only, we match on *SEC* using *Manual* and the other control variables as matching

Table 5 (continued)

variables. We perform the matching separately for each half-year (i.e., for the periods January to June and July to December in each year), without replacement, and using a maximum propensity score distance (or caliper) of 0.0001. In Panel C, all regressions are estimated at the firm-month level and include year-month and firm fixed effects. The analyses are based on the NASDAQ venue history (period: January 2001 to October 2010) and include firm-month observations from all venues. *E-Ticker* is a dummy variable equal to one if a firm's ticker is temporarily suffixed with the letter "E", and zero otherwise. The Bulletin Board adds this suffix to flag firms that are delinquent in their SEC reporting. *E-Ticker BB-to-BB* indicates one subset of the E-Ticker cases where firms subsequently return to compliance with SEC reporting requirements and are therefore allowed to stay on the Bulletin Board. *E-Ticker BB-to-NBB* indicates the other subset of the E-Ticker cases where firms never return to compliance with SEC reporting requirements and are forced to leave the Bulletin Board. We also include, but do not report the coefficients on, trading venue indicators, indicators for SEC filing and manual inclusion status, lagged control variables and price-level controls. No filters are imposed in these analyses. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

Table 6*Regression analysis: State merit reviews*

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
Merit review	0.049*** (3.94)		0.005 (0.87)	
Merit review (with manual exemption)		0.039*** (2.61)		0.007 (1.10)
Merit review (w/o manual exemption)		0.052*** (4.09)		0.004 (0.73)
SoInc $\neq$ SoHqt	0.083*** (10.52)	0.082*** (10.41)	0.033*** (9.28)	0.033*** (9.33)
Trading venue indicators	Yes	Yes	Yes	Yes
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	542,607	542,607	425,950	425,950
R-squared	0.23	0.23	0.06	0.06

This table presents regression analyses relating liquidity and crash risk to the strictness of Blue Sky laws at the state level. For details on the proxies for liquidity (t) and crash risk (t to t+2), see Table 3. All regressions are estimated at the firm-month level and include year-month and industry fixed effects. The analyses are based on the NASDAQ venue history (period: January 2001 to October 2010) and include only firm-month observations from the OTC market (BB and NBB). *Merit review* is a composite score of the strictness of the state's merit review with a minimum (maximum) value of zero (one), as described in section 3. For each sample firm, we use *Merit review* for its state of headquarters because most states require home state registration. In the second specification, we distinguish between states that offer a manual exemption and those that do not (*with* or *w/o manual exemption*). For example, *Merit review (with manual exemption)* takes the value of *Merit review* only when firms are headquartered in a state with a manual exemption, and is zero otherwise. *SoInc $\neq$ SoHqt* is a dummy variable that equals one for firms incorporated outside the state of their headquarters, and zero otherwise. We also include, but do not report the coefficients on, trading venue indicators, indicators for SEC filing and manual inclusion status, lagged control variables and price-level controls (see Tables 4 and 5 for details). No filters are imposed in these analyses. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

Table 7*Regression analysis: Pink Sheets tiers and Caveat Emptor*

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
Caveat Emptor	0.007 (0.21)	-0.059* (-1.83)	0.065*** (2.71)	-0.042 (-0.83)
Pink No Info	0.136*** (5.33)	0.213*** (6.13)	-0.037 (-1.18)	-0.314*** (-4.83)
Pink Limited Info	0.443*** (14.22)	0.339*** (8.88)	-0.072** (-2.19)	-0.389*** (-5.89)
Pink Current Info	0.353*** (10.29)	0.453*** (10.36)	-0.143*** (-4.16)	-0.512*** (-7.21)
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	79,090	79,090	45,310	45,310
R-squared	0.17	0.60	0.06	0.27

This table presents regression analyses relating liquidity and crash risk to indicators for the Pink Sheets information tiers and the Caveat Emptor label. For details on the proxies for liquidity (t) and crash risk (t to t+2), see Table 3. All regressions are estimated at the firm-month level and include year-month and firm fixed effects. The analyses are based on a proprietary dataset provided by the OTC Markets Group (PS tier history; period: October 2007 to October 2010) and include only firm-month observations from the NBB (Pink Sheets and Grey Market). *Caveat Emptor* is a dummy variable indicating firms that are flagged by the OTC Markets Group as having a public interest concern. *Pink No Info*, *Pink Limited Info* and *Pink Current Info* are dummy variables for firms in the respective Pink Sheets information tier, introduced by the OTC Markets Group in 2007. Grey Market firms are the omitted category. We also include, but do not report the coefficients on, indicators for SEC filing and manual inclusion status, lagged control variables and price-level controls (see Tables 4 and 5 for details). The analyses are subject to the following sample filters: for the liquidity regressions, we exclude months in which firms change Pink Sheets information tiers and/or their Caveat Emptor status; for the crash risk regressions, the month of, and the six months before, such changes are excluded. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

Table 8*Return analysis by information regime***Panel A: NBB firm months**

Portfolio weighting	NBB			
	SEC no		SEC yes	
	Manual no	Manual yes	Manual no	Manual yes
Equal	-0.049*** (-10.22)	-0.050*** (-6.79)	-0.053*** (-7.99)	-0.060*** (-8.47)
Value	-0.055*** (-9.60)	-0.016*** (-2.70)	-0.058*** (-6.24)	-0.040*** (-4.79)

Panel B: BB and SCM firm months

Portfolio weighting	BB		SCM	
	SEC required		SEC required	
	Manual no	Manual yes	Manual no	Manual yes
Equal	-0.052*** (-11.73)	-0.050*** (-8.97)	-0.016** (-2.55)	-0.004 (-0.89)
Value	-0.058*** (-13.36)	-0.041*** (-6.08)	-0.028*** (-3.36)	-0.008** (-2.56)

This table presents alpha estimates from monthly time-series regressions that relate equal- and value-weighted portfolio log returns at the information regime-level (venue, SEC filing and manual inclusion status) to a five factor asset pricing model comprising market, size, value, momentum and the Pastor-Stambaugh (2003) liquidity factors. The liquidity factor is available at Lubos Pastor's website. The other factors come from Kenneth French's website. For each factor, we include the contemporaneous value as well as three lags to account for thin trading. Firm-months in which the information regime changes (due to a venue switch and/or a change in the SEC filing or manual inclusion status) are excluded from the regressions. Panel A reports estimates for NBB (i.e., Grey Market and Pink Sheets) firms. Panel B reports estimates for firms on the Bulletin Board (BB) and on the NASDAQ Small Cap market (SCM). The table reports OLS coefficient estimates and (in parentheses) t-statistics based on Newey-West standard errors. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

For Online Publication

Internet Appendix

“The Twilight Zone: OTC Regulatory Regimes and Market Quality”

This appendix provides supplemental discussion and analysis for our manuscript “The Twilight Zone: OTC Regulatory Regimes and Market Quality”.

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IA.1 Industry and geographic characteristics by sample group

Table IA.1 presents statistics on the distribution by industry (Panels A and B), state of headquarters (Panel C) and state of incorporation (Panel D) of each sample group.

Panel A shows that financials are the largest group, followed by firms in cyclical services, information technology and non-cyclical consumer products. However, there are notable differences across sample groups. For instance, while financials dominate in most groups, firms operating in cyclical services and information technology constitute a larger fraction of the *Fallen angels* category. The latter finding is intuitive as these industries face significant fundamental uncertainty. Panel B provides a more detailed industry classification. Financial services companies and banks represent the two largest industry groups for firms that remain in the OTC throughout, while pharmaceuticals and health care firms are also among the top five industries in the *Rising stars* category and the benchmark group *NASDAQ SCM*.

Panel C illustrates that most OTC sample firms are headquartered in California, Florida, New York and Texas, and shows that the distribution of headquarters across states is related to population. A relatively large proportion of new firms is based in a country other than the U.S. or Canada (*New firms (remain in OTC)*: 9%; *Rising stars (new firms)*: 18%). This suggests that the OTC market has become popular among foreign companies in recent years. Panel D shows that the majority of the OTC firms is incorporated in Delaware or Nevada. While Delaware is the top state in most sample groups, firms in the *New firms (remain in OTC)* category are most often incorporated in Nevada. Untabulated statistics show that 70% of the sample firms choose to incorporate in a state that is different from their state of headquarters. These numbers are comparable to those in Litvak (2011) showing that over 80% of Compustat firms are incorporated outside their home state.

Table IA.1
Panel A: Broad industry categories by sample group

Industry group	Sample group																	
	In OTC only (start in 2001)		New firms (remain in OTC)		Comeback firms (remain in OTC)		Rising stars (start in 2001)		Rising stars (new firms)		Rising stars (comeback firms)		Fallen angels (from exchange)		Total OTC		Benchmark: NASDAQ SCM	
	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share
Basic industries	168	3%	79	3%	15	6%	14	4%	17	9%	5	7%	78	5%	356	3%	7	3%
Cyclical consumer goods	101	2%	51	2%	7	3%	9	2%	5	3%	5	7%	55	3%	221	2%	7	3%
Cyclical services	876	18%	473	17%	52	19%	34	9%	35	18%	17	24%	387	23%	1805	18%	20	9%
Financials	1,644	34%	1,109	40%	58	21%	130	35%	25	13%	6	8%	234	14%	3,142	31%	112	53%
General industrials	373	8%	117	4%	21	8%	24	7%	18	9%	8	11%	155	9%	687	7%	12	6%
Information technology	606	12%	247	9%	37	14%	31	8%	18	9%	3	4%	405	24%	1307	13%	18	8%
Non-cyclical consumer	544	11%	289	10%	33	12%	73	20%	45	23%	6	8%	257	15%	1208	12%	29	14%
Non-cyclical services	108	2%	48	2%	14	5%	5	1%	8	4%	10	14%	71	4%	240	2%	0	0%
Resources	353	7%	277	10%	23	9%	43	12%	13	7%	7	10%	46	3%	732	7%	7	3%
Unclassified	9	0%	9	0%	0	0%	0	0%	0	0%	0	0%	0	0%	18	0%	0	0%
Utilities	116	2%	83	3%	10	4%	4	1%	8	4%	4	6%	26	2%	237	2%	1	0%
Total	4,898	100%	2,782	100%	270	100%	367	100%	192	100%	71	100%	1,714	100%	10,294	100%	213	100%

Panel B: Top 5 industries by sample group (within-group share)

Rank	Sample group															
	In OTC only (start in 2001)		New firms (remain in OTC)		Comeback firms (remain in OTC)		Rising stars (start in 2001)		Rising stars (new firms)		Rising stars (comeback firms)		Fallen angels (from exchange)		Total OTC	
	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share
1	Financial Svc	19%	Financial Svc	27%	Financial Svc	12%	Banks	33%	Pharma	11%	Banks	7%	Software	15%	Financial Svc	18%
2	Banks	12%	Banks	12%	Banks	8%	Pharma	9%	Banks	9%	Engineering	7%	Technology	9%	Banks	12%
3	Software	9%	Software	7%	Software	8%	Health care	7%	Retailers	6%	Telecomm	7%	Banks	6%	Software	9%
4	Support Svc	5%	Oil & gas	5%	Technology	6%	Oil & gas	7%	Food	6%	Travel	7%	Support Svc	6%	Support Svc	5%
5	Health care	4%	Media	5%	Support Svc	5%	Technology	4%	Electronics	6%	Oil & gas	6%	Pharma	5%	Technology	4%

Panel C: Top 5 states of headquarters by sample group (within-group share)

Rank	Sample group															
	In OTC only (start in 2001)		New firms (remain in OTC)		Comeback firms (remain in OTC)		Rising stars (start in 2001)		Rising stars (new firms)		Rising stars (comeback firms)		Fallen angels (from exchange)		Total OTC	
	State	Share	State	Share	State	Share	State	Share	State	Share	State	Share	State	Share	State	Share
1	California	15%	California	17%	California	16%	California	16%	Other country	18%	Illinois	11%	California	22%	California	17%
2	Florida	9%	Other country	9%	Florida	10%	Texas	10%	California	15%	Georgia	10%	New York	10%	Florida	9%
3	New York	8%	Florida	9%	Texas	8%	Florida	7%	New York	10%	New York	10%	Texas	7%	New York	8%
4	Texas	7%	Canada	9%	New York	6%	New York	7%	Texas	8%	Texas	10%	Florida	6%	Texas	7%
5	Not found	5%	New York	7%	Canada	6%	New Jersey	5%	Florida	5%	California	7%	Massach.	5%	Other country	5%

Panel D: Top 5 states of incorporation by sample group (within-group share)

Rank	Sample group																	
	In OTC only (start in 2001)		New firms (remain in OTC)		Comeback firms (remain in OTC)		Rising stars (start in 2001)		Rising stars (new firms)		Rising stars (comeback firms)		Fallen angels (from exchange)		Total OTC		Benchmark: NASDAQ SCM	
	State	Share	State	Share	State	Share	State	Share	State	Share	State	Share	State	Share	State	Share	State	Share
1	Delaware	30%	Nevada	48%	Delaware	40%	Delaware	33%	Delaware	49%	Delaware	70%	Delaware	60%	Delaware	33%	Delaware	43%
2	Nevada	24%	Delaware	20%	Nevada	32%	Nevada	13%	Nevada	26%	Nevada	13%	Nevada	5%	Nevada	27%	Ohio	6%
3	Florida	7%	Florida	6%	Florida	6%	California	5%	Florida	5%	Georgia	4%	California	4%	Florida	6%	Virginia	6%
4	Colorado	5%	California	5%	Colorado	4%	Florida	5%	Colorado	3%	Colorado	3%	New York	3%	California	4%	New York	4%
5	California	4%	Colorado	3%	S. Carolina	2%	Colorado	4%	California	3%	Texas	3%	Florida	3%	Colorado	4%	N. Carolina	4%

This table presents firm-level statistics on industry, state of headquarters and state of incorporation by sample group. Panel A provides information on broad industry categories. Panel B shows the top 5 industries using a more detailed industry categorization. Panel C reports the top 5 states in which the sample firms have their headquarters. Panel D focuses on the top 5 states of incorporation. For firms that switch industries or state of headquarters/incorporation, we use the industry or state where the firm spends the longest time during the sample period. For details on the sample groups, see Table 1 in the paper.

IA.2 Market-based firm characteristics by sample group

Table IA.2 provides descriptive statistics on market-based firm characteristics for our OTC sample by sample group.

Panel A shows that the mean (median) volume-weighted market value is about \$50 million (\$16 million) across all OTC sample firms. The large difference between the mean and median indicates a highly right-skewed distribution. Firms in the *In OTC only (start in 2001)* group tend to be smallest: the median is about \$7 million and more than a quarter have market values of less than \$2 million. Firms in the *Rising stars (new firms)* and *Rising stars (comeback firms)* categories tend to be largest, with median capitalizations of about \$102 million and \$243 million, respectively.

Panel B shows that the volume-weighted stock price is also skewed with a mean (median) of \$6.29 (\$0.97) across all OTC sample firms. The *In OTC only (start in 2001)* group has the lowest-priced stocks. In contrast, a large fraction of *Benchmark* firms from the *NASDAQ SCM* trade above one U.S. dollar.

Panel C shows that firms in the OTC market exhibit, on average, negative annualized log returns over the entire sample period (mean: -60.54%; median: -46.92%). There is substantial variation across sample groups. For example, while the median annualized log return for the *Fallen angels (from exchange)* group is -57.18% over the sample period, it is 7.29% for firms in the *Rising stars (comeback firms)* category. Each sample group has firms with large positive returns. Untabulated statistics show that even among firms that remain in the OTC market there are more than 1,500 stocks with cumulative log returns above 10% over the entire sample period. Figure 3 in the paper illustrates this heterogeneity with a histogram of returns for all firm years in the OTC sample. While stock returns are indeed negative for the majority of firm years, some

annual returns are extremely high.¹ Taken together, these results are consistent with Eraker and Ready (2015).

Panel D shows that return volatility (measured as the standard deviation of monthly log returns) is high in the OTC market. Again, large differences are visible across OTC sample groups. For instance, the median volatility for new firms that remain in the OTC market (0.4105) is almost twice the volatility of firms in the *Rising stars* groups and more than three times the volatility of *NASDAQ SCM Benchmark* firms.

Table IA.2

Panel A: Average market value in \$ across months (volume weighted)

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	4,324	23,650,361	58,857,402	1,763,832	7,137,372	22,151,167
New firms (remain in OTC)	2,333	41,685,405	69,365,755	8,070,141	20,897,540	46,358,073
Comeback firms (remain in OTC)	265	54,112,084	102,000,000	7,941,486	20,244,404	49,166,814
Rising stars (start in 2001)	367	131,700,000	111,400,000	47,387,900	99,317,836	189,300,000
Rising stars (new firms)	185	161,100,000	148,400,000	56,888,572	102,500,000	232,700,000
Rising stars (comeback firms)	62	286,600,000	209,400,000	119,000,000	243,300,000	405,200,000
Fallen angels (from exchange)	1,704	86,948,311	122,500,000	11,786,122	34,013,840	112,700,000
Total OTC	9,240	49,558,751	92,745,888	4,573,388	16,218,931	48,497,290
Benchmark: NASDAQ SCM	213	54,247,622	54,956,444	20,164,496	38,267,305	68,834,112

Panel B: Average stock price in \$ across months (volume weighted)

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	4,897	7.24	22.44	0.12	0.47	1.93
New firms (remain in OTC)	2,782	3.95	13.99	0.34	0.89	2.29
Comeback firms (remain in OTC)	270	7.50	22.72	0.38	1.01	3.29
Rising stars (start in 2001)	367	11.13	10.00	3.94	7.73	16.29
Rising stars (new firms)	188	7.78	6.99	3.30	5.35	9.61
Rising stars (comeback firms)	66	15.51	13.74	5.30	12.92	22.94
Fallen angels (from exchange)	1,710	5.65	9.12	1.09	2.79	6.85
Total OTC	10,280	6.29	18.15	0.26	0.97	4.20
Benchmark: NASDAQ SCM	213	11.39	9.26	4.06	9.59	14.80

¹ Note that the statistics in Table IA.2 are based on log returns at the firm level, whereas Figure 3 shows the distribution of discrete returns at the firm-year level.

Panel C: Annualized log returns over entire sample period

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	4,800	-56.82%	71.65%	-88.42%	-44.56%	-3.52%
New firms (remain in OTC)	2,726	-72.20%	99.87%	-129.79%	-62.08%	-11.46%
Comeback firms (remain in OTC)	264	-62.23%	79.99%	-117.63%	-47.70%	-5.26%
Rising stars (start in 2001)	359	-5.17%	31.35%	-18.60%	1.27%	16.52%
Rising stars (new firms)	188	-9.10%	49.44%	-29.95%	-3.23%	21.38%
Rising stars (comeback firms)	69	7.77%	67.74%	-14.83%	7.29%	22.12%
Fallen angels (from exchange)	1,678	-72.43%	81.76%	-97.43%	-57.18%	-16.72%
Total OTC	10,084	-60.54%	82.38%	-97.50%	-46.92%	-4.93%
Benchmark: NASDAQ SCM	207	12.21%	28.25%	-3.03%	10.11%	27.04%

Panel D: Volatility of monthly log returns

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	4,898	0.3503	0.1811	0.2203	0.3789	0.4772
New firms (remain in OTC)	2,782	0.3950	0.1844	0.2721	0.4105	0.5184
Comeback firms (remain in OTC)	270	0.3858	0.1776	0.2544	0.3958	0.5076
Rising stars (start in 2001)	367	0.2210	0.1143	0.1154	0.2159	0.2925
Rising stars (new firms)	192	0.2550	0.1161	0.1676	0.2435	0.3268
Rising stars (comeback firms)	71	0.2166	0.1100	0.1482	0.1880	0.2695
Fallen angels (from exchange)	1,714	0.3384	0.1392	0.2427	0.3305	0.4315
Total OTC	10,294	0.3540	0.1764	0.2273	0.3684	0.4765
Benchmark: NASDAQ SCM	213	0.1384	0.0739	0.0788	0.1219	0.1873

This table presents firm-level descriptive statistics by sample group. Panel A (Panel B) reports statistics for average market value (average stock price) weighted by dollar trading volume. Panel C summarizes the distribution of annualized log returns over the entire sample period. Panel D provides statistics on the volatility (i.e., the standard deviation) of monthly log returns. For details on the sample groups, see Table 1 in the paper.

IA.3 Trading activity in the OTC market

Table IA.3 provides descriptive statistics on trading activity in the OTC market. These statistics are presented by trading venue at the firm-month level.

Panel A shows that the mean (median) proportion of trading days is 40.31% (28.57%) across all firm-months in our OTC sample. These statistics are consistent with Ang et al. (2013) who report a mean proportion of trading days of about 53% across their sample of OTC stocks (see also Bollen and Christie, 2009). Trading frequency varies substantially in the cross-section of our sample. For example, while about 11% of OTC stocks trade every day (untabulated), a quarter of all OTC stocks have zero volume on 95% of the days. There is also systematic variation in trading frequency across venues. For example, the median proportion of trading days is 57.14% for firms on the Bulletin Board (BB) but only 4.55% for Grey Market firms.

Panel B shows that trading volume on trading days is generally low, with a mean (median) of \$31,667 (\$2,376) across all firm-months in our OTC sample. Again, there is substantial variation across trading venues. For example, while BB firms have a median volume of \$7,145, the median volume for firms in the Pink Sheets (Grey Market) is merely \$420 (\$12). In several instances, the mean values are influenced by large outliers (e.g., for firms in the Grey Market).

Taken together, this analysis shows that trading activity tends to be low in the OTC market but also that it varies predictably across venues. By and large, more regulated venues have more actively traded securities.

Table IA.3**Panel A: Proportion of trading days over firm month**

Venue	# Firms months	Mean	StDev	P25	P50	P75
NBB Missing	203,961	23.66%	31.02%	0.00%	9.52%	35.00%
NBB Grey Market	29,564	13.96%	23.11%	0.00%	4.55%	15.79%
NBB Pink Sheets	183,793	36.59%	34.28%	5.00%	25.00%	63.64%
BB	316,357	55.67%	35.76%	21.74%	57.14%	94.74%
Total OTC	733,675	40.31%	36.67%	5.00%	28.57%	76.19%
SCM (Benchmark or to/from OTC)	41,169	82.96%	22.74%	70.00%	95.24%	100.00%
Exchange (to/from OTC)	73,029	94.01%	15.17%	100.00%	100.00%	100.00%

Panel B: Average daily trading volume in \$ - non-zero trading volume days only

Venue	# Firms months	Mean	StDev	P25	P50	P75
NBB Missing	134,467	24,028	350,282	21	400	3,747
NBB Grey Market	15,915	25,216	291,904	0	12	552
NBB Pink Sheets	152,795	22,207	203,067	44	420	3,618
BB	292,639	40,467	184,345	1,912	7,145	23,704
Total OTC	595,816	31,667	239,390	211	2,376	12,603
SCM (Benchmark or to/from OTC)	40,707	163,034	471,037	10,877	29,872	95,307
Exchange (to/from OTC)	65,168	570,768	986,981	28,359	121,820	595,829

This table presents descriptive statistics on trading activity in the OTC market. These statistics are provided by trading venue at the firm-month level. Panel A provides statistics on the proportion of trading days (i.e., days with non-zero trading volume). Panel B reports statistics on the average daily dollar trading volume on trading days (i.e., conditional on daily trading volume being non-zero). *NBB* includes both Grey Market and Pink Sheets firms. A proprietary dataset provided by the OTC Markets Group (the PS venue history) allows us to identify these subsamples. The remaining firms for which this separation is not possible are flagged as *NBB Missing*. *BB* refers to firms on the Bulletin Board. *SCM* indicates firms on the NASDAQ Small Cap market and comprises firms in the benchmark group (see Table 1 in the paper) as well as firms that come from or switch to the OTC market. *Exchange* captures firms listed on the traditional exchanges (AMEX, NASDAQ or the NYSE) that come from or switch to the OTC market. No filters are imposed in these analyses.

IA.4 Validation of market quality proxies

In this section, we validate our market quality proxies. First, in Table IA.4a, we compare our liquidity proxy and its input variables with two commonly used liquidity measures: the price impact measure suggested by Amihud (2002) and the bid-ask spread. For both measures, higher values indicate more illiquid stocks. As expected, our liquidity proxy is negatively correlated with both the Amihud measure and the bid-ask spread (see Panel B). These correlations are sizeable (e.g. the Spearman correlation coefficients are -0.5836 and -0.696 respectively, and the Pearson correlation coefficients are similar) and statistically significant, suggesting that our proxy does indeed capture stock liquidity. Note that we do not use the Amihud measure or the bid-ask spread in our main analyses because both measures are available for only a subset of our sample. Specifically, the Amihud measure (bid-ask spread) is available for merely 53% (23%) of the firm-months used in the liquidity analysis reported in Table 4, Panel A, of the paper.

Second, in Table IA.4b, we use data on pump and dump (or P&D) schemes to validate our proxy for crash risk. A P&D scheme is a fraudulent form of market manipulation that involves the manipulator taking a long position in a stock before artificially increasing demand through an unsolicited campaign (e.g., via email, phone or fax). Prior research shows that P&D campaigns often lead to temporary price increases and subsequent corrections or crashes (e.g., Frieder and Zittrain, 2008; Hanke and Hauser, 2008). Thus, if our proxy (measured over the current and the two subsequent months) captures (future) crash risk, we expect it to increase significantly for stocks that are subject to P&D schemes. We test this relation for a large sample of P&D schemes based on four different data sources (described in the table notes). The regression results confirm the expectation that the crash risk proxy increases following P&D schemes: The

coefficient on the *Pump and Dump* indicator is positive and statistically significant in each panel. This increase in crash risk is also economically large in every specification. For example, the coefficient estimate for the *Pump and Dump* indicator in the first specification in Panel A (0.167) corresponds to roughly one-third of the standard deviation of the crash risk proxy of 0.4934 (not tabulated, but similar to the statistics reported in Table 3, Panel B in the paper; the small difference is due to differences in the sample filters employed in the main analysis).

Taken together, the results reported in this section provide evidence that our market quality proxies capture liquidity and crash risk, respectively.

Table IA.4a

Panel A: Descriptive statistics

Variable	# Firms months	Mean	StDev	P25	P50	P75
[1] Liquidity	711,964	-0.0016	0.6905	-0.5522	-0.2302	0.3744
[2] Prop. of zero return days	711,964	0.6349	0.3418	0.3182	0.7368	0.9524
[3] Share turnover	711,964	0.1532	0.3406	0.0031	0.0309	0.1344
[4] Log(Amihud measure)	377,602	-5.0193	3.1495	-7.1306	-5.0181	-2.8772
[5] Log(Bid-ask spread)	161,625	-2.3969	1.5952	-3.4245	-2.2513	-1.2528

Panel B: Correlation matrix

Variable	# Firms months	[1]	[2]	[3]	[4]	[5]
[1] Liquidity	711,964		-0.9706	0.9131	-0.5836	-0.6496
[2] Prop. of zero return days	711,964	-0.8644		-0.8228	0.6581	0.6763
[3] Share turnover	711,964	0.8586	-0.4844		-0.4094	-0.5659
[4] Log(Amihud measure)	377,602	-0.5367	0.6543	-0.3363		0.8859
[5] Log(Bid-ask spread)	161,625	-0.6232	0.6619	-0.4172	0.8841	

This table compares our liquidity proxy and its input variables (see Table 3 in the paper for details) with two commonly used liquidity measures: The *Amihud measure* is the median daily price impact in a given month. We follow Amihud (2002) and compute the daily price impact as the absolute log return divided by dollar trading volume (measured in thousands). We compute monthly medians using days with non-zero returns (e.g., Daske et al., 2008). The *Bid-ask spread* is the median daily percent spread in a given month. The daily percent spread is the difference between the closing ask price and the closing bid price, divided by the midpoint. We use the natural logarithm of the *Amihud measure* and the *Bid-ask spread* because both variables are right-skewed. Panel A presents descriptive statistics at the firm-month level. Panel B reports Spearman (above the diagonal) and Pearson (below the diagonal) correlations at the firm-month level. All correlations are statistically significant at the 1% level (two-tailed). For consistency with the regression analysis reported in Table 4 in the paper (based on the NASDAQ venue history), we exclude months in which firms change trading venues.

Table IA.4b**Panel A: All P&D firm months**

Independent variables	Dependent variable: Crash risk (t to t+2)			
	All venues		NBB only	
Pump and Dump	0.167*** (9.84)	0.100*** (6.25)	0.209*** (6.56)	0.084*** (2.86)
Trading venue indicators	Yes	Yes		
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	491,328	491,328	174,337	174,337
R-squared	0.07	0.16	0.07	0.20

Panel B: Matched P&D firm months only

Independent variables	Dependent variable: Crash risk (t to t+2)			
	All venues		NBB only	
Pump and Dump	0.219*** (7.64)	0.141*** (5.26)	0.280*** (5.61)	0.118** (2.55)
Trading venue indicators	Yes	Yes		
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	491,328	491,328	174,337	174,337
R-squared	0.07	0.16	0.07	0.20

This table presents regression analyses relating crash risk to pump and dump (P&D) schemes. For details on the proxy for crash risk (t to t+2), see Table 3 in the paper. The basic research design is the same as in Table 5, Panel B of the paper, including the sample filter imposed (i.e., the month of and the six months before changes in SEC filing and/or manual inclusion status are excluded). *Pump and Dump* is a dummy variable equal to one for months in which a firm is subject to market manipulation through a P&D scheme, and zero otherwise. We identify P&D schemes from four data sources: (1) the database compiled by Frieder and Zittrain (2008); for details, see www.cyber.law.harvard.edu/stockspam; (2) the Stock Spam Effectiveness Monitor that is used by Hanke and Hauser (2008); for details, see www.crummy.com/features/StockSpam; (3) www.spamnation.info; this website is now offline, we use a copy from February 2012; (4) the Qwoter's Spam Report; for details, see www.qwoter.com/spam. In Panel A, the *Pump and Dump* indicator equals one for 1,073 firm-months with a P&D scheme according to at least one data source (384 firm-months in NBB only). In Panel B, the *Pump and Dump* indicator equals one for a subset of 356 firm-months with a P&D scheme according to all four data sources (141 firm-months in NBB only). The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively

IA.5 Liquidity changes around trading venue transitions

We examine liquidity changes around trading venue transitions to tighten identification. If differences in disclosure regimes across venues drive the differences in liquidity reported in the paper, we should find a change in liquidity around venue transitions, with liquidity deteriorating when the regime weakens and improving when the regime strengthens. Accordingly, we study the change in monthly liquidity in a short window spanning 6 months before through 6 months after the date of a firm's transition from one trading venue to another. We map out the liquidity response by estimating a separate coefficient for each month in event time, while including year-month and transition fixed effects.

Table IA.5 presents the key coefficient estimates. Figure 4 in the paper plots these coefficient estimates for selected specifications. For transitions from NBB (i.e., the Pink Sheets or Grey Market) to BB (Bulletin Board), the coefficient estimates on the pre-transition indicators are significantly negative, while those on the post-switch indicators are significantly positive. Since the base case is liquidity in the transition month, these coefficients imply that liquidity is lower before the transition and higher afterwards. The pre-transition coefficients are fairly uniform with no apparent trend. The difference in the coefficients around the transition (month $m+1$ relative to month $m-1$) is four times larger than the next largest difference in the coefficients for adjacent months. For BB to NBB transitions, this pattern is reversed.

These results imply that liquidity improves significantly when a firm moves from the NBB to the BB (i.e., when its regulatory regime strengthens) and declines significantly when a firm moves from the BB to the NBB (i.e., when its regulatory regime weakens). The effects occur right around the transition month. There is little evidence of pre-transition trends in liquidity, as would be expected with reverse causality.

Table IA.5

Independent variables	Dependent variable: Liquidity (t)			
	NBB to BB		BB to NBB	
	All	Clean only	All	Clean only
Pre-Transition (m-6)	-0.085***	-0.074***	0.187***	0.143***
Pre-Transition (m-5)	-0.065***	-0.069***	0.184***	0.127***
Pre-Transition (m-4)	-0.073***	-0.062***	0.174***	0.143***
Pre-Transition (m-3)	-0.088***	-0.089***	0.176***	0.145***
Pre-Transition (m-2)	-0.064***	-0.066***	0.168***	0.129***
Pre-Transition (m-1)	-0.040***	-0.036**	0.120***	0.109***
Post-Transition (m+1)	0.049***	0.051***	-0.039***	-0.057***
Post-Transition (m+2)	0.065***	0.070***	-0.034***	-0.065***
Post-Transition (m+3)	0.066***	0.069***	-0.027***	-0.053**
Post-Transition (m+4)	0.095***	0.089***	-0.006	-0.012
Post-Transition (m+5)	0.101***	0.086***	-0.024**	-0.008
Post-Transition (m+6)	0.115***	0.107***	-0.029**	-0.020
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Transition fixed effects	Yes	Yes	Yes	Yes
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	8,542	5,577	31,900	6,957
R-squared	0.70	0.69	0.66	0.68

This table presents regression analyses relating liquidity to trading venue transitions. For details on the proxy for liquidity, see Table 3 in the paper. The regressions focus on 13-month windows around venue transitions. We exclude transitions for firms that switch venues multiple times during this window. All regressions are estimated at the firm-month level and include year-month and transition fixed effects. The first specification examines 821 transitions from the NBB (Pink Sheets or Grey Market) to the BB (Bulletin Board). The second specification analyzes a subset of 539 clean transitions from the NBB to the BB. This subset includes only firms that do not change their SEC filing status during the transition window. The third (fourth) specification focuses on 2,573 transitions (a subset of 563 clean transitions) from the BB to the NBB. All specifications include indicators for each of the 6 months before and the 6 months after the transition (i.e., the transition month, m , is the omitted category). We also include, but do not report the coefficients on, indicators for SEC filing and manual inclusion status, lagged control variables and price-level controls. The table reports OLS coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively, based on standard errors clustered by firm.

IA.6 SEC filing and manual inclusion effects for financial companies

This analysis exploits the fact that financial companies (i.e., banks and insurance companies) are regulated and required to provide disclosure filings to their respective regulators. As a result of this institutional feature, we expect SEC reporting and manual inclusion to be less important for the information environment of financial companies. Thus, the effects of SEC and manual reporting on liquidity and crash risk should be smaller for banks and insurance companies, all else equal. We consider this analysis as an alternative way to test whether SEC reporting and manual inclusion drive the market quality results reported in the paper.

We retrieve industry details from several databases (SNL, Datastream, Worldscope and Factset) and focus on the subset of firms for which at least two of these databases provide coincident information. We estimate the models reported in Table 5 in the paper, but add terms that interact the variables *Manual* and *SEC* with a *Financials* indicator variable that is equal to one for banks and insurance companies, and zero otherwise.

Table IA.6 shows that the coefficients on *SEC*Financials* and *Manual*Financials* are, as expected, significantly negative for liquidity and significantly positive for crash risk when using firm-month observations from all venues. When focusing on the subset of NBB firms (i.e., firms traded in the Pink Sheets or the Grey Market) that do not report to the SEC, the coefficients on *Manual*Financials* are significantly negative for liquidity, but not significant for crash risk. Thus, in this sample, the manual results are somewhat weaker. Overall, however, the coefficients on the interactions are generally significant and of the opposite sign to the main effects, indicating weaker or even non-existent effects for financial companies. These findings corroborate our interpretation that SEC reporting and manual inclusion drive market quality and ease concerns about alternative explanations (such as omitted variables).

Table IA.6**Panel A: Liquidity (t)**

Independent variables	Dependent variable: Liquidity (t)			
	All venues		NBB with SEC = 0 only	
[1a] Manual	0.071*** (8.17)	0.065*** (9.42)	0.135*** (9.30)	0.111*** (11.08)
[1b] Manual * Financials	-0.089*** (-5.58)	-0.045*** (-3.05)	-0.113*** (-2.94)	-0.050** (-2.08)
[2a] SEC	0.078*** (6.60)	0.060*** (6.75)		
[2b] SEC * Financials	-0.182*** (-8.96)	-0.092*** (-4.05)		
[1a] + [1b] = 0 [p-value]	[0.18]	[0.11]	[0.54]	[0.01]
[2a] + [2b] = 0 [p-value]	[<0.01]	[0.15]		
Trading venue indicators	Yes	Yes		
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	575,066	575,066	198,657	198,657
R-squared	0.42	0.63	0.14	0.50

Panel B: Crash risk (t to t+2)

Independent variables	Dependent variable: Crash risk (t to t+2)			
	All venues		NBB with SEC = 0 only	
[1a] Manual	-0.033*** (-11.36)	-0.006 (-1.43)	-0.038*** (-3.03)	-0.020 (-1.24)
[1b] Manual * Financials	0.048*** (7.98)	0.027** (2.57)	-0.015 (-0.39)	0.016 (0.35)
[2a] SEC	-0.046*** (-5.73)	-0.061*** (-6.71)		
[2b] SEC * Financials	0.088*** (5.60)	0.057** (2.37)		
[1a] + [1b] = 0 [p-value]	[0.01]	[0.04]	[0.15]	[0.93]
[2a] + [2b] = 0 [p-value]	[0.01]	[0.85]		
Trading venue indicators	Yes	Yes		
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	412,388	412,388	116,086	116,086
R-squared	0.07	0.16	0.08	0.21

This table presents regression analyses relating liquidity (Panel A) and crash risk (Panel B) to SEC filing and manual inclusion status for financial companies. For details on the proxies for liquidity and crash risk, see Table 3 in the paper. The basic research design is the same as in Table 5 in the paper. In addition, we interact the key variables *Manual* and *SEC* with the dummy variable *Financials* that is equal to one for banks and insurance companies, and zero otherwise. For this analysis, we retrieve industry details from several databases (SNL, Datastream, Worldscope and Factset) and focus on the subset of firms for which at least two of these databases provide coincident information. The first two specifications include firm-month observations from all venues. The third and fourth specifications focus on firm-month observations from the NBB (Pink Sheets and Grey Market) for firms that are not registered with the SEC. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

IA.7 Adding firm-fixed effects to the analysis of state merit reviews

In order to tighten identification in our state merit review analysis, we employ a more restrictive fixed effects structure. The regressions in the paper use industry fixed effects. Here, we employ firm fixed effects. Recall that the state merit review variable is assigned on the basis of the state in which a firm's headquarters is located. The inclusion of firm fixed effects means that the merit review coefficients are identified based on changes in firms' state of headquarters.

We identify 1,337 cases in which firms change their state of headquarters during the sample period. Table IA.7 shows that the results for liquidity become even stronger when we include firm fixed effects. For example, the coefficient estimate on *Merit Review* is 0.049 (t-statistic 3.94) with industry fixed effects (see Table 6 in the paper), but is almost twice as large with firm fixed effects (0.085; t-statistic 2.71). The coefficient on *Merit review (w/o manual exemption)* also increases substantially. The result that the coefficient on *Merit review* is larger in states without a manual exemption than in states with a manual exemption is similar to that reported in Table 6 of the paper. For crash risk, the coefficients remain insignificant and close to zero, similar to the results reported in the paper. Overall, these results ease concerns about alternative explanations or omitted variables in the liquidity analysis.

Table IA.7

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
Merit review	0.085*** (2.71)		0.020 (1.12)	
Merit review (with manual exemption)		0.055 (1.48)		0.001 (0.04)
Merit review (w/o manual exemption)		0.092*** (2.89)		0.026 (1.38)
SoInc $\neq$ SoHqt	0.015 (0.72)	0.012 (0.57)	-0.013 (-0.97)	-0.015 (-1.14)
Trading venue indicators	Yes	Yes	Yes	Yes
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	542,607	542,607	425,950	425,950
R-squared	0.53	0.53	0.16	0.16

This table presents regression analyses relating liquidity and crash risk to the strictness of Blue Sky laws at the state level. For details on the proxies for liquidity (t) and crash risk (t to t+2), see Table 3 in the paper. The basic research design is the same as in Table 6 in the paper except that the regressions in this table include firm fixed effects instead of industry fixed effects. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

IA.8 Pink Sheets information tiers and financial companies

In this section, we exploit the fact that financial companies (i.e., banks and insurance companies) are subject to additional disclosure requirements. Consequently, market quality is less likely to be affected by information regimes in the Pink Sheets. The analysis is similar to the analysis in section IA.6. Namely, we use the same research design as in our main tests (Table 7 in the paper), but add terms that interact the key variables with a *Financials* indicator variable. This indicator is equal to one for banks and insurance companies, and zero otherwise. For this analysis, we combine firms in the Pink Limited Information and Pink Current Information tiers.²

Table IA.8 shows that the coefficient estimates on *Pink No Info*Financials* and *Pink Limited/Current*Financials* are negative for the liquidity and positive for crash risk. More importantly, the sum of the main effect and the corresponding interaction term is insignificantly different from zero in every specification, implying that liquidity and crash risk for financial companies do not vary across the Pink Sheets information tiers. These findings support our interpretation that the Pink Sheets information regimes drive the market quality effects in our main analysis (for non-financial firms).

² Untabulated statistics show that about 61% of all firm-month observations in the PS tier history belong to the Pink No Information tier followed by the Pink Limited Information tier (about 17%) and the Pink Current Information tier (about 13%). To boost power, we combine the latter two categories, for which information availability is substantially greater than for the first group.

Table IA.8

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
[1a] Pink No Info	0.159*** (5.15)	0.196*** (5.58)	-0.080** (-2.30)	-0.324*** (-4.74)
[1b] Pink No Info * Financials	-0.103 (-0.83)	-0.375 (-1.47)	0.163 (1.59)	0.485 (1.11)
[2a] Pink Limited/Current	0.447*** (12.38)	0.333*** (8.64)	-0.126*** (-3.47)	-0.424*** (-6.15)
[2b] Pink Limited/Current * Financials	-0.331*** (-2.66)	-0.419* (-1.68)	0.137 (1.35)	0.603 (1.42)
[1a] + [1b] = 0 [p-value]	[0.64]	[0.48]	[0.39]	[0.71]
[2a] + [2b] = 0 [p-value]	[0.32]	[0.73]	[0.91]	[0.67]
Caveat Emptor indicator	Yes	Yes	Yes	Yes
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	60,153	60,153	35,781	35,781
R-squared	0.17	0.60	0.06	0.27

This table presents regression analyses relating liquidity and crash risk to Pink Sheets information tiers for financial companies. For details on the proxies for liquidity and crash risk, see Table 3 in the paper. The basic research design is the same as in Table 7 in the paper except that we combine firms in the Pink Limited Information and Pink Current Information tiers. In addition, we interact the key variables *Pink No Info* and *Pink Limited/Current Info* with a *Financials* dummy variable that is equal to one for banks and insurance companies, and zero otherwise. For this analysis, we retrieve industry details from several databases (SNL, Datastream, Worldscope and Factset) and focus on the subset of firms for which at least two of these databases provide coincident information. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

IA.9 Regime changes in the Pink Sheets

In this section, we examine the effects of four major regime changes in the Pink Sheets that were aimed at enhancing transparency in this market.³ This analysis tightens identification related to the role of information regimes in the OTC market because the regime changes are set at the market level and hence exogenous to any given firm. If these initiatives are valued by investors, we expect the changes to increase market quality.

A first indication that these regime changes have been influential is the steady decline in the number of firms quoted on the Bulletin Board (BB) but not the Pink Sheets.⁴ To analyze the regime changes more formally, we create a *Regime index* that starts at zero and increases to 0.25 (as of June 2003), 0.50 (as of August 2007), 0.75 (as of June 2009) and to 1.00 (as of April 2010). We then introduce the interaction term $BB \times \text{Regime index}$ in order to capture the effects of these regime changes on BB firms (for which the indicator variable *BB* is one) relative to NBB firms (i.e., firms traded in the Pink Sheets or the Grey Market).

Table IA.9 presents the results of regressions that relate liquidity and crash risk to the *BB* indicator and the interaction term between *BB* and *Regime Index*. The analyses are based on BB and NBB firm-month observations from the NASDAQ venue history (period: January 2001 to October 2010). We present models with year-month and either industry or firm fixed effects.

³ In June 2003, the Pink Sheets introduced Pink Link, an electronic messaging and automated trade negotiation service, to replace the telephone-based communication process. In August 2007, they introduced the information tiers. In June 2009, they introduced Real-Time+, which offers real-time pricing data to all investors at no cost. Traditional exchanges make such data available only with a 15-minute delay. In April 2010, the Pink Sheets refined their information tiers and introduced the OTCQB category (see section 1 in the Appendix in the paper).

⁴ Untabulated analyses show that the fraction of BB-only firms has fluctuated between 5% and 10% between mid-2003 (when the data allowing us to reliably identify finer categories of OTC firms become available) and mid-2007. Starting in August 2007, the fraction declines and it falls below 1% in 2010. By October 2010, there are nine BB-only firms left in our sample, compared to 1,993 dually-quoted BB firms.

Thus, all models include a flexible time trend to capture general and unrelated changes in the Pink Sheets market.

The positive coefficient on the *BB* indicator in the first two specifications shows that market liquidity is generally higher for BB firms at the start of the sample period. However, the coefficient estimate on the interaction term is negative, implying that the liquidity advantage for BB stocks relative to NBB stocks declines over time. In fact, the combined effect at the end of the sample period (when the regime index takes a value of 1) is close to zero suggesting that, by October 2010, liquidity for NBB stocks is close to that for BB firms. The third and fourth specifications illustrate that the results for crash risk are similar. Specifically, BB stocks initially have lower crash risk, but stocks solely quoted in the NBB catch up over time.

Overall, the results in this section show that the market quality advantage (i.e., higher liquidity and lower crash risk) of dually-quoted BB stocks relative to stocks that are solely quoted in the NBB has declined over time, as a result of successive regime changes in the Pink Sheets.

Table IA.9

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
BB	0.334*** (25.37)	0.307*** (27.67)	-0.124*** (-17.11)	-0.162*** (-17.27)
BB x Regime index	-0.391*** (-21.82)	-0.233*** (-13.55)	0.145*** (12.29)	0.042*** (2.87)
Manual and SEC indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Yes	Yes	Yes	Yes
# Firm months	586,436	586,436	344,712	344,712
R-squared	0.23	0.52	0.07	0.18

This table presents regression analyses relating liquidity and crash risk to regulatory changes in the Pink Sheets markets. For details on the proxies for liquidity (t) and crash risk (t to t+2), see Table 3 in the paper. All regressions are estimated at the firm-month level and include year-month and either industry or firm fixed effects. The analyses are based on the NASDAQ venue history (period: January 2001 to October 2010) and include only firm-month observations from the OTC market (BB and NBB). *BB* is a trading venue indicator for firms traded on the OTC Bulletin Board. *Regime index* is an ordinal variable that increases with major reforms in the Pink Sheets regulatory regime. It takes the value of 0 (from the start of the sample period until May 2003), 0.25 (from June 2003 to July 2007), 0.5 (from August 2007 to May 2009), 0.75 (from June 2009 to March 2010) and 1 (from April 2010 to the end of the sample period). We also include, but do not report the coefficients on, indicators for SEC filing and manual inclusion status, lagged control variables and price-level controls (see Tables 4 and 5 in the paper for details). The analyses are subject to the following filters: for the liquidity regressions, we exclude months in which firms change their trading venue and/or the variable *Regime index* increases; for the crash risk regressions, the month of and the six months before such changes are excluded. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

IA.10 Extending the fixed-effects structure

In this section, we provide additional analyses extending the fixed effects structure in our main models. These analyses gauge the sensitivity of our findings to unobserved industry as well as geographic shocks in order to mitigate concerns about omitted variables. To control for (observed and unobserved) economic shocks that are specific to certain industries, we interact *industry* and *year-month* fixed effects (see Panel A of Table IA.10). Likewise, we control for economic shocks that are geographic in nature by including *State of Headquarters* * *year-month* fixed effects (see Panel B) and *State of Incorporation* * *year-month* fixed effects (see Panel C). We also estimate models that include interactions between the trading venue indicators and firm characteristics, such as return volatility and size, to allow for different coefficients on the main control variables by venue (coefficients not tabulated). These extensions do not materially alter the coefficient estimates for our key variables, *Manual* and *SEC*. The robustness of our conclusions to these extensions mitigates concerns that omitted variables or unobserved shocks drive our SEC reporting and manual inclusion results.

Table IA.10

Panel A: Industry x year-month

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
Manual	0.052*** (7.34)	0.056*** (9.67)	-0.028*** (-10.88)	-0.002 (-0.61)
SEC	0.042*** (4.15)	0.048*** (6.26)	-0.050*** (-6.78)	-0.073*** (-8.64)
Trading venue indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Interaction with Industry		Interaction with Industry	
# Firm months	700,744	700,744	491,328	491,328
R-squared	0.40	0.63	0.07	0.16

Panel B: State of headquarters (SoHqt) x year-month

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
Manual	0.058*** (8.24)	0.057*** (9.78)	-0.026*** (-9.93)	-0.003 (-0.78)
SEC	0.040*** (3.95)	0.050*** (6.43)	-0.047*** (-6.39)	-0.070*** (-8.18)
Trading venue indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects	Yes		Yes	
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Interaction with SoHqt		Interaction with SoHqt	
# Firm months	700,744	700,744	491,328	491,328
R-squared	0.41	0.63	0.08	0.17

Panel C: State of incorporation (SoInc) x year-month

Independent variables	Dependent variable: Liquidity (t)		Dependent variable: Crash risk (t to t+2)	
Manual	0.063*** (8.84)	0.057*** (9.79)	-0.022*** (-8.46)	-0.002 (-0.40)
SEC	0.040*** (3.98)	0.050*** (6.41)	-0.051*** (-6.98)	-0.072*** (-8.48)
Trading venue indicators	Yes	Yes	Yes	Yes
Control variables (lagged)	Yes	Yes	Yes	Yes
Price-level indicators	Yes	Yes	Yes	Yes
Firm fixed effects	Yes		Yes	
Industry fixed effects	Yes		Yes	
Year-month fixed effects	Interaction with SoInc		Interaction with SoInc	
# Firm months	700,744	700,744	491,328	491,328
R-squared	0.41	0.63	0.08	0.17

This table presents regression analyses relating liquidity and crash risk to the SEC filing and manual inclusion status of the sample firms. For details on the proxies for liquidity (t) and crash risk (t to t+2), see Table 3 in the paper. The basic research design is the same as in Table 5 in the paper, and uses firm-month observations from all venues. In this table, we enhance the basic design by including extended fixed effects. In Panel A, we add interacted *industry* x *year-month* fixed effects to capture shocks that are specific to certain industries. In Panel B (Panel C), we add interacted *state of headquarters* x *year-month* (*state of incorporation* x *year-month*) fixed effects to control for shocks that are geographic in nature. The table reports OLS coefficient estimates and (in parentheses) t-statistics. The t-statistics are based on standard errors clustered by firm. ***, **, * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

IA.11 Short selling in the OTC market

In this section, we provide evidence on how difficult it is to short sell stock in the OTC market. Table IA.11 presents statistics on the supply of stock lending for short selling at the firm-quarter level. The analysis is based on a dataset that includes information on the supply of lendable stocks and covers the period 2006Q3 to 2010Q3.⁵

Panel A shows that the dataset covers only a fraction of our sample. However, coverage varies systematically as data are more likely to be available for firms in regulated trading venues and, within trading venues, for firms that have higher market values. For example, data coverage is 21.5% for firms in the Bulletin Board (BB) but only 4.0% for firms in the Grey Market. The median market value is \$18.6 million for covered BB firms compared to \$9.0 million for the full BB sample. To the extent that stocks of large firms are more likely to be subject to short selling (e.g., D'Avolio, 2002), the dataset therefore overestimates the prevalence of short selling activity.

Panel B illustrates that the supply of lendable stocks is negligible in the OTC market, even for a sample of larger firms with available data. There is no supply at all for more than half of the firm-quarters in the BB and in the Grey Market. The mean supply of lendable stocks across these firm-quarters is about \$583,000 or 1.28% relative to market value. This evidence is very different from the statistics in Prado et al. (2016) who focus on U.S. stocks listed on traditional exchanges over the same period, and document an average supply of 20.02% relative to market value.

⁵ We are very grateful to Pedro Saffi for running our sample through his dataset of stock lending supply. See Prado et al. (2016) for details on the data.

Taken together, the analysis in this section provides strong evidence that short selling is extremely difficult in the OTC market. Consequently, even sophisticated investors will find it hard, if not impossible, to correct overpricing in this market.

Table IA.11

Panel A: Data availability

Venue		Full sample			Subsample with available data		
		# Firm quarters	Market value (\$)		# Firm quarters	Market value (\$)	
			Mean	Median		Mean	Median
NBB	Missing	19,000	13,336,625	345,474	332	59,873,790	12,863,230
NBB	Grey Market	4,619	5,652,014	12,820	186	7,654,041	64,013
NBB	Pink Sheets	34,275	9,869,787	356,414	2,446	36,136,878	4,280,290
BB		42,620	26,269,369	8,958,107	9,172	40,636,233	18,626,439
Total OTC		100,514	17,285,055	1,964,039	12,136	39,750,171	15,044,930
SCM (Benchmark or to/from OTC)		4,635	55,415,910	32,402,640	3,810	60,792,815	36,316,116
Exchange (to/from OTC)		8,002	156,104,217	81,924,004	7,329	163,475,652	89,599,768

Panel B: Statistics on supply of lendable stocks

Venue		Subsample with available data					
		# Firm quarters with Supply > \$1,000,000		Supply (\$)		Supply / Market value	
			\$1,000	Mean	Median	Mean	Median
NBB	Missing	42	143	1,136,027	200	1.22%	0.00%
NBB	Grey Market	3	38	242,734	0	8.15%	0.00%
NBB	Pink Sheets	338	1,361	1,906,575	3,000	3.50%	0.18%
BB		402	2,998	216,614	0	0.55%	0.00%
Total OTC		785	4,540	582,776	0	1.28%	0.00%
SCM (Benchmark or to/from OTC)		1,190	3,140	2,784,523	268,350	2.59%	0.96%
Exchange (to/from OTC)		4,861	6,986	24,290,191	3,906,500	8.91%	5.35%

This table presents descriptive statistics on the supply of lendable stocks in the OTC market by trading venue at the firm-quarter level. The dataset covers the period 2006Q3 to 2010Q3. Panel A shows how many firm-quarters in our sample are covered by this dataset and compares average market values across the full sample and the covered subsample. Panel B provides statistics on the supply of lendable stocks in dollars and relative to the firms' market values. For details on the trading venue categories, see Table 3 in the paper.

IA.12 Example firms

In this section, we provide descriptive details on seven typical OTC firms. For each firm, we state its sample group (as defined in Table 1 in the paper) and describe its main business (as of the end of our sample period or the last available date), sales and employee information (if available), its place of incorporation and location, its evolution including important corporate events, trading venue and reporting history.

Example firm 1: ZYTO Corp. (OTC only)

ZYTO is engaged in the manufacturing and distribution of “biocommunication” devices and software designed to facilitate communication between computers and the human body in a process called a “biosurvey.” It markets its applications primarily to health care professionals. The firm is in the Surgical and Medical Instruments industry (SIC 3841). At the end of 2011, ZYTO had approximately 30 employees. Sales in recent years were \$1.7 million (2007), \$1.9 million (2008) and \$4 million (2011).

ZYTO is headquartered in Utah and incorporated in Delaware. The firm was created in September 2006 following a reverse merger of Nevada-based ZYTO Corp. with Delaware-based Quiver Corp. In July 2007, it raised \$1.4 million in a Reg D offering from 36 investors (18 of which were unaccredited). As of March 2012, it had 221 holders of record.

The firm traded in the Pink Sheets from 2006 to April 2011 when it became dually quoted on the Bulletin Board (BB). The firm has a website (www.zyto.com), which includes a press release section with quarterly performance reports and other information of interest. The firm did not provide financial statements before 2008. While solely in the Pink Sheets, its information label fluctuated between No Information, Limited Information and Current Information. It filed for SEC registration in July 2010 and made its first 10-K filing in March

2011. In December 2012, the firm announced its voluntary termination of SEC registration and return to the Pink Sheets, largely for cost reasons. As of April 2013, the firm is labeled as Current Information, as it continues to provide financial statements (certified by its attorney), despite no longer being registered with the SEC. Since February 2010, the firm has been covered in the S&P manual.

Example firm 2: Quri Resources Inc. (OTC only)

Quri Resources is engaged in the discovery, exploration, and development of gold, silver, copper, and other mineral resources. Its properties include the Wellington mining project in Ecuador and the Oatman gold project consisting of various mining concessions in Arizona. The firm is in Metal Mining Services (SIC 108). In 2011, Quri had two employees. Its revenue was \$89,000 (2011) and \$97,000 (2010). The company is incorporated in Delaware, with principal places of business in Miami, Florida and Quito, Ecuador. Before February 2009, Quri was named Transoft Technologies, Inc.

The firm was quoted in the Grey Market through November 2006 and has been quoted in the Pink Sheets since then. In May 2009, the Pink Sheets information label switched from Limited Information to No Information. Since October 2010, Quri has been labeled Caveat Emptor, warning investors that the OTC Markets Group has been unable to contact the company or confirm its location. The Pink Sheets website shows Quri's last financial report as of November 30, 2008.

The Quri Resources website (www.quriresources.net) is no longer active, and has been replaced by a new one (www.quriresources.com). The latter website provides no financial information and calls itself a "blog." It describes the company as being "interested in the technology surrounding the recovery of precious metals and rare gems from the earth's soil."

The firm is not covered in our two manuals. In September 2010, the SEC charged Quri with orchestrating a “pump and dump” scheme.⁶ The SEC alleges that the firm issued several false and misleading press releases about impending acquisitions between February and June 2009, allowing CEO Jaime Gomez to sell shares at inflated prices for a total gain of \$27,100.

Example firm 3: Clarent Hospital Corp. (OTC only)

Clarent Hospital owned and operated acute health-care hospitals and related healthcare businesses. It is in Health Care Equipment & Services (SIC 8062). The firm was based in Houston, Texas and incorporated in Delaware in 1980. Its predecessor was Paracelsus Healthcare Corporation, which filed for bankruptcy in 2000. Clarent emerged from these bankruptcy proceedings and reincorporated as a private company in 2001. In November 2001, Clarent sold its Westwood Medical Center and used the proceeds to boost liquidity and pay down a portion of its debt. On October 14, 2008, the firm announced that it would pay a dividend of 0.10 per share and the remaining assets would be placed in a liquidating fund. The proceeds of this fund would go to the shareholders of record as of Dec 19, 2008. As of December 20, 2008, Clarent Hospital Corp. went out of business.

Clarent was quoted in the Grey Market and the Pink Sheets. The firm did not have a website and never filed with the SEC. Neither Mergent nor S&P covered the firm in their manuals.

Example firm 4: Miracor Diagnostics, Inc. (Fallen angel; OTC only during sample period)

Miracor Diagnostics, Inc. provided medical diagnostic imaging services in the U.S. Its industry is Services – Specialty Outpatient Facilities (SIC 8093). Originally in the oil and gas sector, the firm became solely a medical firm in January 1994. Starting in July 1998, it moved

⁶ See <http://www.sec.gov/litigation/complaints/2010/comp21675.pdf>.

into the diagnostic business through asset acquisitions. By 2005, the firm operated 13 wholly owned centers in California, Florida, Illinois, Ohio, and Oregon. These centers offered magnetic resonance imaging, computed tomography and other diagnostic imaging services in a patient-friendly environment. The number of employees remained constant between 2003 and 2005 at approximately 100. Revenues increased steadily to a level of \$20 million in 2005.

The company was incorporated in Utah in February 1980 and headquartered in California.⁷ In 2006, the firm started to lose money and, in March 2007, it suspended payments to secured lenders and sought to restructure its debt. In April 2007, Miracor filed for bankruptcy. The firm emerged from bankruptcy in December 2007 and subsequently abandoned all significant operations. In June 2009, the state of Utah effectively ordered the company's administrative dissolution.

The firm's shares traded on the NASDAQ SCM until March 1998 (i.e., prior to the start of our sample period in 2001), when it was delisted and moved to the BB. It traded in this market until May 2007—between February 2003 and May 2007 it was dually-quoted on the BB and the Pink Sheets. As of June 2007—shortly after filing for bankruptcy and ceasing reporting—the firm was removed from the BB and traded exclusively in the Pink Sheets, where its information tier was No Information. In July 2010, the stock was finally removed from the OTC market.

The company had a website (www.miracor.com). It was listed in Mergent's Manual through December 2006, but not covered by S&P. The firm was an SEC filer through 2007. In April 2007, the firm notified the SEC that it was unable to file its 2006 annual report, and might never file again. In June 2010, the SEC cited Miracor for being delinquent in its filings.

⁷ The firm was incorporated as Gold Probe in 1980 and changed its name to Hailey Energy Corporation in September 1981 after acquiring Hailey Energy Company. There were further name changes to Cytprobe in 1992, to Medical Device Technologies in April 1995, and to Miracor in October 1999.

Example firm 5: True Religion Apparel (Rising star)

True Religion Apparel, Inc. designs and sells premium clothing (denim jeans and assorted sportswear) to consumers globally. Its industry is Apparel & Clothing Manufacturers (SIC 2300). As of March 2013, the company operated 124 stores in the U.S. and 31 international stores. Its products are also sold at major department stores and the firm licenses its name for selected products. In December 2012, True Religion had 3,086 employees. Its net sales have grown rapidly over the years from \$270.0 million in 2008 to \$467.3 million in 2012.

The firm was incorporated in Nevada in 2001 under the name Gusana Explorations Inc. At the time, it was based in Vancouver, Canada and its business plan was to explore and develop mineral properties. Later, the firm searched for opportunities in the clothing industry as an extension of its existing operations, and eventually decided to let its mining claims lapse. In June 2003, the firm acquired all the shares of Guru Denim, Inc. via a reverse merger and, in August 2003, changed its name to True Religion Apparel, Inc., with headquarters in California. In 2008, it changed its state of incorporation to Delaware. On May 10, 2013, the firm announced that it would be acquired by the investment management firm TowerBrook Capital Partners LP in an \$835 million deal. The price of \$32 per share in cash represented a 9 percent premium over the previous day's closing price and a 52 percent increase over the price in October 2012.

The firm's shares were quoted on the BB starting in March 2003, and migrated to NASDAQ in August 2005. As of February 2013, True Religion had only 56 holders of record but roughly 11,500 beneficial shareholders. The firm has a website (www.truereligionbrandjeans.com). It has filed reports with the SEC every year since 2002 (the reports are also available on the firm's website). It has not been covered by the securities manuals.

Example firm 6: Broadwind Energy (Rising star, comeback firm)

Broadwind Energy provides technologically advanced products and services to customers in the wind energy, oil and gas, mining, and infrastructure industries, primarily in the U.S. but also in other industrial markets. Its operations include the production of wind turbine towers, fabrication of specialty weldments, production and repair of precision gears and gearing systems, and blade and gearbox maintenance services. The firm is in the Electrical Apparatus & Equipment industry (SIC 5063). On December 31, 2012, Broadwind Energy had 753 employees. Its total revenues were \$185.9 million (2011) and \$210.7 million (2012).

The firm incorporated in Nevada in 1996 as Blackfoot Enterprises, Inc. The business plan was to sell replica totem poles and cigar store Indians but the firm ran out of funds and became a shell company in January 1997. In February 2006, following a reverse merger between Blackfoot and privately-held Tower Tech Systems Inc., Blackfoot changed its name to Tower Tech Holdings Inc., and moved its headquarters to Wisconsin. In January 2008, the firm reincorporated in Delaware and shifted its headquarters to Illinois, changing its name to Broadwind Energy, Inc. in February 2008. Over the years, it grew and evolved through several acquisitions. In 2011, the firm faced class-action lawsuits related to officer breach of fiduciary trust and SEC inquiries related to accounting irregularities. As of April 2013, these legal matters had not been resolved entirely. Broadwind Energy had 66 holders of record as of February 2013.

The firm's common stock was quoted in the OTC market since March 2004. It was dually quoted in the BB starting in June 2005. The stock began trading on NASDAQ's National Market in April 2009, and changed its listing to the NASDAQ SCM in December 2011. The firm has a website (www.broadwindenergy.com), where it provides 10-K, 10-Q and 8-K reports. It has voluntarily reported to the SEC since its beginnings in 1996, well before entering our

sample as an OTC firm and making it an example of a comeback firm. The firm was listed in Mergent's securities manual as of January 2009 and in the S&P manual as of July 2009.

Example firm 7: The NASDAQ OMX Group (Rising star)

NASDAQ OMX Group, Inc. is a holding company providing trading, clearing, securities listing, and technology services on a global scale. It is in the Security and Commodity Brokers, Dealers, Exchanges, and Services industry (SIC code 6200). The firm operates the NASDAQ stock market, eSpeed (a new Treasuries trading platform) in the US, several exchanges in Europe, including those in Stockholm, Copenhagen, Helsinki, Iceland and the Baltic states. It also operates a derivatives market for power and a clearing house for freight and seafood in Norway, an interest rates derivatives market in London, as well as energy and carbon derivatives products (NASDAQ OMX Commodities). As of December 31, 2013, NASDAQ OMX had 3365 employees. Total revenues were 3.21 billion in 2013 compared to 3.12 billion in 2012 and 3.44 billion in 2011. The firm is incorporated in Delaware and headquartered in New York.

Nasdaq was founded in 1971 as a wholly-owned subsidiary of the National Association of Securities Dealers, Inc. (NASD; now FINRA). In 2006, Nasdaq reorganized into a holding company. The NASDAQ Stock Market became an independent registered national securities exchange in 2007. In February, 2008, Nasdaq and OMX AB merged their businesses to form the NASDAQ OMX Group, Inc.

Commencing June 2000, the NASD began the process of separating Nasdaq from the NASD, as well as raising financing for both entities, via a private placement of common stock to NASD members, investment companies and issuers listed on NASDAQ. Following the expiration of trading restrictions on these shares, public trading in the common stock started July 1, 2002 on the BB under the ticker symbol NDAQ. The stock was quoted on the BB through

February 9, 2005, then migrated to NASDAQ, following a secondary offering of shares priced at \$9 per share. On February 7, 2014, the firm's share price was \$37.54, and it had approximately 586 holders of record.

The firm has a website, <http://www.nasdaqomx.com/>, where it provides 10-K, 10-Q and 8-K reports. As a result of the private placement of its stock, the firm became an SEC filer as of June 2001. The firm was listed in Mergent's Manual as of January 2008 and in the S&P manual as of July 2008.

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