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ABSTRACT

We analyze a comprehensive sample of more than 10,000 U.S. stocks in the OTC market. As little is known about this market, we first characterize OTC firms by trading venue and provide evidence on survival, success, frequency of venue changes, reporting status, and trading activity. A large number of new firms appear on the OTC market each year. With few exceptions, these new firms exhibit poor performance and rarely rise to trade on traditional exchanges. We analyze how market liquidity, price efficiency and crash risk, all of which capture aspects of market quality, differ across OTC venues and firms subject to different regulatory regimes, including federal securities and state blue sky laws. We show that OTC firms that are subject to stricter regulatory regimes have higher market liquidity and price efficiency, and lower return skewness. We also analyze OTC market features that are potential substitutes for SEC registration, such as publication in a securities manual or state merit reviews, and provide evidence on their capital-market effects. This evidence is relevant in light of the JOBS Act and the ensuing relaxation of SEC registration requirements. Overall, our results suggest that investors consider information and regulatory differences when trading OTC stocks.

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1. Introduction

Aside from its highly regulated traditional exchanges, the U.S. has a large OTC market in which over 8,000 domestic equity securities were publicly traded in 2010. For over 4,500 of these stocks, the issuer is not an SEC registrant and hence not required to provide regular disclosure filings to the SEC. OTC firms exempt from federal securities laws are often referred to as "dark." However, these firms are subject to state corporate and securities laws as well as trading venue-based rules requiring disclosures. As a result, firms that do not file with the SEC are not necessarily dark and they are often subject to registration requirements at the state level. The OTC market is a twilight zone with many different regulatory regimes. It generally offers less investor protection than the traditional exchanges and, in fact, fraudulent and abusive practices in the OTC market cause significant economic harm to investors.[1]

The OTC market illustrates the tradeoff securities regulators face between their desire to create a viable market for small growth firms and their charter to ensure investor protection. This tradeoff has again come into focus with the passage of the JOBS Act in 2012.[2] The Act intends to lower the regulatory burden on firms when they access public capital markets, so as to spur the creation of "emerging growth firms." One of its key provisions is to loosen the ownership limits for SEC registration, which will likely increase the number of unregistered securities in the OTC market. In addition, issuers will be able to use crowd-funding via social media and the internet. Both of these changes raise significant concerns with respect to investor

[1] In 2011, state securities regulators conducted over 6,000 investigations and took more than 2,600 enforcement actions, resulting in over 1,600 years of incarceration, fines or penalties in excess of $290 million and more than $2.2 billion in investor restitution orders (NASAA, 2011). While not all of these cases pertain to the OTC market, the largest category is fraud cases involving unregistered individuals selling unregistered securities.

[2] There also has been substantial debate about the regulatory burden facing smaller firms after the Sarbanes-Oxley Act of 2002. For overviews, see Coates (2007) and Leuz (2007).

protection (e.g., Goldstein, 2012; Martin, 2012). In light of this debate, it is important to understand the efficacy of existing regulatory regimes in the OTC market and, in particular, the role of SEC registration.

In this paper, we examine a comprehensive sample of stocks trading in the venues that together comprise the OTC market. The purpose of our analysis is twofold. As relatively little is known about this market, we first characterize firms trading in the OTC market and provide descriptive statistics by firm type and OTC venue. We also furnish statistics on market entry, survival, frequency of venue changes, reporting status and trading activity. Second, we analyze the role of regulatory regimes that govern the OTC market. We focus on how regulatory regimes with different levels of transparency and investor protection affect investor demand and market quality, as reflected in secondary trading, market liquidity and price efficiency.

There are three venues in the OTC market: the Bulletin Board, the Pink Sheets and the Grey Market. Bulletin Board firms have been required to file with the SEC since the Eligibility Rule in 1999. By contrast, the Pink Sheets and the Grey Market do 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.[3] Thus, firms trading in the Pink Sheets or the Grey Market may be SEC filers and hence provide regular disclosure. For SEC registrants, federal law preempts state regulation and hence sets the relevant rules.

For non-registrants, state corporate law and state securities law provide the relevant rules for disclosure and registration. State corporate law, which depends on the state of incorporation,

[3] 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 is the holder of record.

may stipulate that shareholders receive financial statements, or can obtain them on request. State securities laws (so 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, i.e., in every state where a firm sells securities to the public, as well as in the states of both buyer and seller in the secondary market. There is very little research on the capital-market effects of state securities regulation. This is surprising considering that state securities regulation predates the formation of the Securities and Exchange Commission, the Securities Acts of 1933 and 1934, as well as the formation of regulatory bodies such as FINRA (formerly NASD).[4]

An important way in which firms can comply with state securities laws is to use the so-called manual exemption. In 42 states, issuers are exempt from registration and "blue-sky compliant" if they are published in "a nationally recognized securities manual" such as Mergent's (formerly Moody's) Manuals, Standard & Poor's Corporation Records, and others. The providers of manuals perform a (basic) review of documents supplied by the issuer, 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 publication in a securities manual on secondary trading.

In addition to federal and state regulation, there are venue-based regimes. As mentioned, the Bulletin Board requires SEC disclosure filings. In August 2007, the Pink Sheets market operator introduced several tiers and information labels differentiating firms for which current information, limited information or no information is available. In addition, it created a "Caveat

[4] State securities regulators have been protecting investors from fraud and abusive sales practices since the passage of the first "blue sky" law in Kansas in 1911 (e.g., Macey and Miller, 1991). Moreover, fraud involving unregistered securities is more likely to be prosecuted by state securities regulators based on state laws than by federal securities regulators.

Emptor" label to flag firms for which adequate current information is not available and that are the subject of promotional activities. Such activities include spam emails, unsolicited faxes or news releases by the issuer or a third party. All tier designations and labels are monitored by the Pink Sheets, and revised as firms' information status changes. Again, there is limited academic research on venue-based regimes (Bushee and Leuz, 2003; Jiang et al., 2012).

Our sample consists of 10,583 firms that trade in the OTC market between 2001 and 2010 and are incorporated in the U.S. Most OTC firms are incorporated in Delaware (34%), Nevada (26%), and Florida (6%). They come from a broad set of industries, with financial services, banking, software and computer services, support services and media being the most common. About half of our sample is traded in the OTC market at the beginning of the sample period, and about 17% of the firms enter our sample because they delist from the traditional exchanges ("fallen angels"). The remainder of our sample comprises over 3,400 "new" firms that appear in the OTC market between 2001 and 2010 without having been listed on an exchange before. However, less than 9% of these new firms eventually trade up to the traditional exchanges during our sample period.[5] Even for these "rising stars," the total return over the sample period is often negative and on average merely 4% (annualized). Thus, the OTC market is generally not a breeding ground for young growth firms that eventually graduate to the traditional exchanges.

At the same time, most OTC stocks survive and are quoted for long periods of time. The five-year survival rate is between 60% and 90%, depending on definition, venue and time period chosen. The median firm stays in our sample for 8.75 years. Even firms that delist from the

[5] Trading up to the exchanges is even less common among OTC firms in general (about 6%). It is most common for banks, pharmaceuticals, biotech & health care firms, and oil & gas producers.

exchanges continue to trade in the OTC markets for several years. Thus, the OTC market is more than an interim home for firms that are on their way out of the public markets.

The OTC market consists predominantly of micro-cap stocks. The average firm has a market capitalization of about $52 million. But this average is skewed by a few large firms with a market capitalization exceeding $1 billion. Most firms have a market value below $20 million and a quarter of the firms have a value below $5 million. The median share price is $1.01, consistent with OTC firms being called "penny stocks." The average and median return for OTC firms over the sample period are -27% and -37% (annualized), respectively, indicating that the majority of the firms exhibits a negative performance. At the same time, average monthly volatility is more than twice as high as the volatility of NASDAQ Small Cap stocks. In addition, returns are skewed and a substantial fraction of OTC stocks, regardless of type and venue, 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 (2013).

Considering the nature of the OTC market, it is not surprising that trading activity and liquidity are much lower than on the traditional exchanges. On average, OTC stocks trade every second day. On days with trade, the average daily volume is only around $100,000. However, even NASDAQ Small Cap stocks trade only on 76% of the days and their average daily trading volume is not much larger (about $150,000). As with other characteristics, there is substantial heterogeneity across OTC stocks. About 10% of the stocks trade almost every day, yet a quarter of the Pink Sheets stocks trade only on 10% of the days.

Having characterized stocks in the OTC market, we analyze how OTC information and regulatory regimes relate to market quality, which we capture with proxies for market liquidity

and price efficiency. Due to the low trading activity in these markets, we use the percentage of zero-return days as the main proxy for liquidity. We also examine share turnover. To capture both overreaction and underreaction in share prices, we use the absolute value of the return autocorrelation as our main efficiency proxy. In addition, we analyze negative skewness in returns, which can be viewed as proxy for "crash risk" (e.g., Chen et al., 2001). We find that market liquidity and price efficiency are lower in the OTC market than on the traditional exchanges and that both decline monotonically as the OTC market's information environment deteriorates (i.e., moving from the Bulletin Board to the Pink Sheets to the Grey Market). We also document that OTC firms that file disclosures with the SEC have higher market liquidity, both in terms of fewer zero-return days and higher share turnover, and more efficient prices, as indicated by less return autocorrelation and less negatively skewed returns. These results hold with firm-fixed effects and propensity matching. Similarly, OTC firms that are published in Mergent's or Standard & Poor's securities manuals exhibit higher liquidity and price efficiency. Thus, our results are consistent with the interpretation that investors recognize differences in the information regimes across OTC stocks and venues and trade accordingly.

Next, we analyze whether differences in states' blue sky laws affect market liquidity and price efficiency. As state securities laws generally rely on merit reviews by state regulators, the mechanism by which they affect markets is less obvious than for federal securities laws, which are based on a disclosure doctrine. Firms' registration filings with the state regulators are generally not easily accessible and hence the information contained in them is unlikely to directly contribute to market liquidity or price efficiency. However, merit reviews by state securities regulators could contribute indirectly by screening out firms for which concerns about

adverse selection and investor protection are more severe. Consistent with this notion, we find that market liquidity and price efficiency are higher for firms located in states with tougher merit review regimes. The effects are also stronger in states that do not offer a manual exemption and hence do not allow manual publication to substitute for state registration and merit review.

Turning to venue-based regulation, we analyze differences in market liquidity and price efficiency associated with the newly introduced Pink Sheets tiers and information labels. Using firm-fixed effects, we find that market liquidity and price efficiency increase monotonically from the lowest to the highest Pink Sheets tier. The Caveat Emptor label is strongly associated with larger negative return skewness (or crash risk), consistent with the investor protection concerns for stocks in this category. Stocks with this label also exhibit very low levels of liquidity, comparable only to Grey Market firms. We find that indicators for SEC filing and manual publication have relatively small (if any) effects in the presence of the Pink Sheets tier indicators. This evidence suggests that the Pink Sheets information regime largely subsumes the two other information indicators. Moreover, judging from the associated levels of market liquidity and price efficiency, SEC filing, manual publication, and a Current Information label by the Pink Sheets appear to be relatively close substitutes to investors. Finally, we analyze whether recent regulatory efforts by the Pink Sheets are associated with increases in market liquidity and price efficiency relative to the Bulletin Board. Our evidence is consistent with this interpretation, showing that by the end of our sample period, market quality in the Pink Sheets has essentially caught up with market quality in the Bulletin Board.

Our paper makes several contributions to the literature. First, our study paints the most complete picture of the OTC market to date. We create novel data that allow us to make finer

distinctions within the OTC market in terms of trading venue and reporting status than prior studies.[6] Using these data, we provide extensive descriptive statistics, including location, state of incorporation, market entry, survival, venue changes, and trading activity. Such descriptive evidence is important considering how little is known about this market, but it is particularly relevant in light of recent changes in SEC registration requirements introduced by the JOBS Act.

Second, we provide liquidity and price efficiency analyses for the OTC market, examining each of the venues as well as federal-, state-, and venue-specific regulatory regimes in the OTC market. In particular, our analyses incorporate time-series data on SEC filing, publications in two recognized securities manuals, and information labels on the Pink Sheets website. We show that these regulatory and information regimes map into differences in market liquidity and price efficiency as predicted by theory. Thus, our market quality analysis contributes to a more nuanced understanding of investor behavior in the OTC market, suggesting that *at least some* investors recognize regime differences and trade (or abstain from trading) accordingly. As such, our study complements prior asset pricing studies suggesting that many OTC investors may be less sophisticated and seek lottery-like payoffs (Eraker and Ready, 2013; Ang et al., 2013).

Third, there is little prior evidence on the link between securities laws and price efficiency in stock markets. Much of the literature has focused on market liquidity. Our analyses document robust associations between stricter regulatory regimes at the federal, state and venue level, and lower return autocorrelation and negative return skewness.

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[6] Ang et al. (2013) have a more restrictive cross-section but a longer sample period consistent with their asset pricing analysis. Eraker and Ready (2013) also focus on asset pricing in the OTC market. Our focus is on regulatory and information regimes. There are only a few additional studies on the OTC market (Luft et al., 2001; Bushee and Leuz, 2005; Luft and Levine, 2004; Marosi and Massoud, 2007; Leuz et al., 2008; Bollen and Christie, 2009; Jiang et al., 2012). These studies are based on specific OTC subsamples, smaller cross-sections, or do not make venue and reporting status distinctions within the OTC market.

Last but not least, our paper highlights the relevance of state securities laws for the OTC market, including merit reviews, manual exemptions as well as the ensuing manual publications. The OTC market is often viewed as dark and unregulated but in fact there are alternative regimes for information provision and a thicket of complicated state regulations. We know very little about the effects of these regimes, which govern trading for 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 secondary trading, market liquidity and price efficiency.

The remainder of the paper proceeds as follows. In Section 2, we provide a brief overview of the relevant regimes in the OTC market. In Section 3, we describe our data sources and how we construct our novel panel dataset combining venue, SEC filing, Pink Sheets tier, and manual information. Section 4 provides descriptive statistics for our sample firms. Section 5 presents the liquidity, price efficiency, and abnormal return analyses. Section 6 concludes.

2. Regulatory Regimes in the OTC Market: Overview

In this section, we introduce the OTC market venues and discuss legal requirements for quoting and trading OTC securities (see also Figure 1). We also describe the state securities laws and corporate laws that are relevant for understanding the information regimes faced by the many OTC firms that do not report to the SEC. Appendix 1 provides more institutional details.

2.1 OTC Market 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 OTC Bulletin Board (BB) opened in June 1990 and is currently owned, operated and regulated by FINRA. It is an

electronic interdealer quotation system that transmits real-time quotes, trade prices and volume information to subscribing FINRA market makers. Currently, FINRA charges BB market makers a quotation fee of $6.00/security/month. The BB does not have any minimum size or corporate governance requirements and firms whose securities are quoted on the BB are not listed on national securities exchanges. 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 current financial information with the SEC or other regulatory authorities (banking or insurance regulators). Therefore, during our sample period, all BB firms file regularly with the SEC.

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 real-time quotation and execution system for BB eligible securities. By now, virtually all securities quoted and traded on the BB are also quoted and traded on the OTC Markets Group's platform.[8] In addition, the Pink Sheets provide an electronic real-time quotation and execution system for ineligible firms that do not file regularly with the SEC and hence cannot be quoted on the BB by virtue of the Eligibility Rule.

In August 2007, the Pink Sheets introduced a tier system to indicate the levels of financial and corporate disclosure for companies quoted on its platform. This system was further revised in 2010. It distinguishes OTCQB firms, which must report to the SEC and/or a U.S. banking or

[7] The market was first established in 1913 as the National Quotation Bureau (NQB). For decades, the NQB reported stock quotations in the paper-based Pink Sheets, which were named for the color of paper on which they were printed. The NQB changed its name to Pink Sheets LLC in 2000, to Pink OTC Markets in 2008, and adopted its current name, OTC Markets Group, in 2010. We use the term "Pink Sheets" as this is the name it had for most of our sample period.

[8] At the end of our sample period (October 2010), our dataset contains merely 8 BB securities that are not also quoted and traded in the Pink Sheets.

insurance regulator, and 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. The Pink Sheets tiers are described in more detail in Appendix 1.1. The Pink Sheets also alert investors with a Caveat Emptor label when there are investor protection concerns about a company. In addition, the quotes for any stock with such a label that is not in the Pink Current Information tier are blocked on the Pink Sheets website.

Finally, the Grey Market contains firms that are not quoted in any market, i.e., no bids and asks are available. However, trades in Grey Markets stocks may occur and if so are reported by broker-dealers to their Self-Regulatory Organization (SRO).

2.2 OTC Quoting and Trading

OTC transactions have to be reported within 90 seconds to a FINRA Facility, such as the Trade Reporting Facilities (TRF), the Alternative Display Facility (ADF) or the OTC Reporting Facility (ORF). In order to trade non-reporting OTC securities, broker-dealers have to rely on the Securities and Exchange Act of 1934 Rule 15c2-11. This rule prescribes information review and maintenance requirements for broker-dealers 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.

This information can be a prospectus for a SEC registered security; a copy of the offering circular; or a copy of the most recent annual report/annual statement as well as any quarterly report that has been filed since the date of the annual report. Moreover, the broker-dealer shall

keep this information "reasonably" current, and make this information "reasonably" available upon request to a potential investor. To satisfy the rule, a broker-dealer may initiate or resume quotations for an OTC security by filing Form 211 with FINRA.[9] 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 on at least 12 business days out of the past 30 calendar days, with not more than four consecutive business days without quotations. Hence, only one broker-dealer needs to file Form 211 for a particular security. As broker-dealers can subsequently piggy-back on their own quotations, OTC firms do not have to provide regular disclosures to broker-dealers.

2.3 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. Once a firm's Securities Act registration is effective, the Exchange Act of 1934 requires the firm to file reports with the SEC on a continuing basis unless the firm falls below certain size and ownership thresholds.[10]

However, issuers can avoid registering securities with the SEC by issuing securities under one of several exemptions for limited circulation offerings.[11] As long as an issuer using one of these exemptions does not surpass the Exchange Act size and ownership thresholds, it does not

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[9] The form certifies that the broker-dealer has satisfied all applicable requirements of SEC Rule 15c2-11 and the filing and information requirements of NASD Rule 6640. Rule 15c2-11 also provides an exception for quotations representing a customer's unsolicited orders or indications of interest provided that the broker-dealer keeps adequate records of any transaction resulting from such orders.

[10] A firm is exempt from SEC registration if it has fewer than 300 holders of record, or it has fewer than 500 shareholders (of record) and less than $10 million in assets for each of its last three fiscal years. The JOBS Act of 2012, which became effective after our sample period, raises the threshold to 2000 record holders and excludes employees and investors that obtain shares via crowd-funding from the definition.

[11] 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.

have to file reports with the SEC. Firms issuing securities that are exempt from SEC registration and reporting still face state laws and venue-based rules, regulating examinations of issuers, financial reporting and secondary trading. This section provides basic information on state securities laws (also called blue sky laws). Appendix 1.2 provides further details.

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, recent federal regulation exempts a large proportion of securities registrations – so called "federally covered securities" – from registration and merit review. Firms listed on national exchanges that are registered with the SEC have covered securities. As a result, state-level merit reviews apply primarily to OTC securities.

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, and many states require the issuer to update the offering information (prospectus including financial statements) periodically. However, it is important to note that the information filed with the state securities regulator is used in the merit review, but typically not made publicly available in the way SEC filings are made available on EDGAR. Anecdotal evidence suggests that it is very difficult to get copies of the registration filings even by visiting the state securities regulators' offices in person. Moreover, less than half the jurisdictions 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). An issuer has to renew its state securities registration(s), and pay additional fees, in order for secondary trading to continue beyond a year.

The requirement to maintain effective registrations in multiple states is clearly a cumbersome way to support secondary trading of unregistered securities. This is why issuers may seek to qualify for one of the exemptions to state securities registration that are also described in Appendix 1.2. Perhaps the most effective way for a firm to obtain an exemption from registering the securities in each state where investors may reside is to be included in a nationally recognized securities manual (Manual Exemption). 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. Thirty-six states explicitly recognize these two manuals when it comes to exemption from state securities registration.

3. Data and Sample

In this section, we describe our data sources and sample selection process. Our sample is determined by two data sources: a proprietary dataset provided by NASDAQ and the commercial database 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.[12] 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.[13] We match the NASDAQ venue history and Datastream via the security identifier CUSIP and/or the company name resulting in an initial sample of 16,965 firms. We eliminate firms that are incorporated outside the United States or file Form 20-F with the SEC. Furthermore, we exclude REITs and firms whose securities are very rarely traded (see Table 1, Panel A, for details). Our final sample consists of 10,803 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 using two additional 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 (about 60% of BB/NBB). The second dataset (PS tier history) enables us to disaggregate the NBB into several information tiers (Pink Current Info, Pink Limited Info and Pink No Info), and it also identifies firms flagged as Caveat Emptor. However, the PS tier history also covers a short time period (October 2007 to October 2010) and includes only a subset of firms in the NASDAQ venue history (about 50% of NBB).

We use directEDGAR to retrieve any 10-K or 10-Q filings by our sample firms during the sample period. These filings allow us to develop a precise SEC filing history for each firm in

[12] 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.

[13] Datastream also offers information on trading venues. However, the item is static and, thus, does not allow us to identify a venue history including potential switches between segments.

our sample. We also use directEDGAR to identify the state of headquarters (SoHqt) and the state of incorporation (SoInc) for the companies that file with the SEC. 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).[14] 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 two key securities manuals.

Our data collection process results in a dataset that comprises 955,716 firm-month observations over the period January 2001 through October 2010.[15]

4. Descriptive Analysis

4.1. Sample Groups

Table 1, Panel B, classifies our sample into various groups with similar venue histories. 10,583 firms trade in the OTC market at some point. The remaining 220 firms trade in NASDAQ's small cap segment throughout and serve as a benchmark group (*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)*: 5,016 firms) or as new firms that enter the sample after January 2001 (*New firms (remain in OTC)*: 3,134 firms). 1,787 firms (17%) trade down from the traditional exchanges to the OTC market (*Fallen angels (from exchange)*).

[14] We were not able to identify SoHqt (SoInc) information through directEDGAR, the NASDAQ issuer profiles or manual collection for 374 or 3.5% (254 or 2.4%) of our sample firms.

[15] However, most of the analyses are based on fewer observations due to missing information. Note also that we truncate all capital market variables at the top and bottom 1% unless the variable is naturally bounded or logged.

Only 646 firms (6%) trade up from the OTC market to the traditional exchanges (*Rising stars (start in 2001)*: 370 firms; *Rising stars (new firms)*: 276 firms).

Table 1, Panel C, shows that 78% of the OTC sample files 10Ks and 10Qs with the SEC at some point during the sample period (8,307 firms). While many *Fallen angels* tend to stop filing with the SEC after trading down to the OTC market (Share SEC while in OTC: 43%), the vast majority of *Rising stars* already registers with the SEC before trading up to the exchange (Share SEC while in OTC: >85%). Half of the OTC sample is included in securities manuals in at least one year (5,246 firms). *Fallen angels* are published in the two securities manuals while in the OTC market more often than any other sample group. Only 2,126 firms (20%) are completely dark over the entire sample period, that is, they never file with SEC and never appear in the two securities manuals. Since all venues outside the NBB require SEC filings, only firms that remain in the OTC market throughout can be completely dark.

To illustrate the types of firms trading in the OTC market, Appendix 2 presents examples of typical firms from the different sample groups in Table 1. For each firm, we provide a short description of its main business, evolution, and reporting history.

4.2. Industry, State of Headquarters and State of Incorporation

Table 2 presents statistics on the distribution of industry (Panels A and B), state of headquarters (Panel C) and state of incorporation (Panel D) for each sample group.[16] Panel A shows that financials comprise the largest group, followed by firms in cyclical services, information technology and non-cyclical consumer products. However, there are notable

[16] While industry is a static item in our database, we identify a few firms that switch state of headquarters or state of incorporation during the sample period. For Table 2, we assign the state in which the firm was headquartered or incorporated in for the longest time.

differences across sample groups. For instance, while financials dominate in most groups, firms operating in cyclical services or information technology are more frequent in the *Fallen angels* category, which 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 relatively frequent in the *Rising stars* categories and the benchmark group.

Panel C illustrates that most sample firms are headquartered in California, New York, Florida or Texas, indicating that the distribution across states is related to population. A relatively large proportion of firms that enter the sample after January 2001 are based in a country other than the U.S. or Canada (*New firms (remain in OTC)*: 9%; *Rising stars (new firms)*: 14%). This statistic suggests that the OTC market has become popular among foreign companies in recent years. Panel D shows that the majority of the OTC firms are incorporated in Delaware or Nevada. While Delaware dominates in most sample groups, firms in the *New firms (remain in OTC)* category are more likely to be incorporated in Nevada. Untabulated statistics show that 74% 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.

4.3. Market-Based Characteristics

Table 3 provides descriptive statistics on market capitalization (Panel A), stock price level (Panel B), stock returns (Panel C), and return volatility (Panel D) by sample group. We compute these statistics by firm over the sample period and then provide the distribution by sample group.

Panel A shows that the mean (median) volume-weighted market capitalization is about $52 million ($17 million) across all OTC sample firms.[17] The size distribution is highly skewed. Firms in the *In OTC only (start in 2001)* group tend to be smallest: the median is about $7.2 million and more than a quarter have market values of less than $2 million. Firms in the *Rising stars (new firms)* category tend to be largest: the median is about $125 million. Panel B shows that the mean (median) volume-weighted stock price is $6.81 ($1.01) across all OTC sample firms, which again indicates an asymmetric distribution. The *In OTC only (start in 2001)* group has a particularly high proportion of low priced stocks (median: $0.48). In contrast, a large majority of *Rising stars* groups and benchmark firms trades above one dollar.

Panel C shows that firms in the OTC market exhibit on average negative total returns over the sample period (mean: -26.54%; median: -36.86%; annualized). As expected, there is substantial variation across sample groups, with fallen angels and firms that remain in the OTC market performing particularly badly. For example, the mean (median) annualized total return for the *New firms (remain in OTC)* group is -18.00% (-44.65%). In contrast, firms in the *Rising stars (new firms)* category display on average positive annualized returns (mean: 4.27%; median: 2.57%). However, every sample group also has several firms with large positive total returns. For example, among rising stars (both categories), the top quartile has annualized total returns of 18% or more. Untabulated statistics show that even among the firms that remain in the OTC market there are more than 1,000 stocks with total returns of more than 10%. Figure 2 illustrates this heterogeneity by plotting a histogram of annual 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

[17] We weight by volume when computing statistics to avoid giving undue weight to periods when OTC stocks are inactive or essentially out of business.

extremely high.[18] Taken together, these results are consistent with Eraker and Ready (2013). They document similar average total returns (-31% for OTC firms over the period 2000-2008) and argue that negative returns are consistent with investors in OTC stocks displaying behavioral biases (e.g., seeking lotteries).

Panel D shows that return volatility is high in the OTC market. Again, there are large differences across OTC sample groups. For instance, the median volatility for firms that remain in the OTC market is almost twice the volatility of firms in the *Rising stars* groups and more than three times the volatility of benchmark SCM firms.

In summary, OTC firms tend to be small "penny stocks" with lottery-like payoffs, that is, negative average stock returns and high return volatility. However, there is substantial variation in these characteristics, both within and across OTC sample groups.

4.4. Survival Statistics and Venue Transitions

Table 4 presents statistics on entrances to and exits from the OTC market and sample (Panel A), venue transitions (Panel B and C) and stock price crashes that likely imply that the firm has ceased to exist (Panel D). Panel A shows that 66% (71%) of the OTC firms are part of the sample at the beginning (at the end) of the sample period in January 2001 (October 2010). The remaining 34% enter the sample later, either as new firms or fallen angles. 29% of the OTC firms 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 14% in the *New firms (remain in OTC)* category fail to survive until the end of the sample period, this proportion

[18] The stock returns in Table 3, Panel C and in Figure 2 are based on discrete returns. Since discrete returns exhibit extreme outliers, we use log returns for the remainder of the analyses (e.g., when calculating the autocorrelation or negative skewness measures), which enables us to keep a more representative sample.

is more than twice as high in the *In OTC only (start in 2001)* category (34%). The *Fallen angels (from exchange)* category experiences the highest attrition rate (46%), which is not surprising given that these firms often delist from the exchanges because of financial difficulties (see also Harris et al., 2008; Macey et al., 2008).

Panel B and C track venue changes for sample firms over a five-year window. Panel B focuses on sample firms existing as of June 2001, June 2003 and June 2005. Panel C analyzes new firms that enter the sample in 2001 (after January), 2003 and 2005, respectively. Panel B shows that very few existing NBB firms trade up to the BB or to the traditional exchanges. For example, of 3,788 firms that are in the NBB as of June 2003, only 7% (1%) trade in the BB (on a traditional exchange) in June 2008. The remaining firms either still trade in the NBB (76%) or are removed from the OTC market in the meantime (15%). In contrast, new NBB firms are much more likely to graduate to a higher venue. For example, of 161 firms that enter the NBB in 2003, 34% (9%) trade in the BB (on a traditional exchange) five years later. Existing BB firms are also unlikely to trade up. For example, of 2,688 firms that are in the BB as of June 2005, only 6% trade on a traditional exchange in June 2010. The remainder still trades in the BB (42%), has moved down to the NBB (36%) or has been removed from the OTC market (16%). New BB firms display a similar transition pattern. Taken together, the evidence suggests that venue transitions are not uncommon but typically involve trade downs to lower ranked venues.

Panels B and C also show that the vast majority of OTC firms remain quoted and hence survive for more than five years, which is noteworthy in light of the poor returns documented earlier. However, it is possible that firms crash and essentially die, yet continue to trade as shells. To explore this possibility, Panel D tracks the incidences of what we label a *Crash* over a

five-year window, starting with sample firms existing as of June 2001, June 2003 and June 2005, respectively.[19] Firms are flagged as having crashed if they experience (i) a cumulative return of -95% at some point during the five-year window and (ii) subsequently have a stock price below 0.01 USD for at least six months. The analysis indicates that, depending on the window, between 12% and 27% of the NBB firms experience a *Crash* in the next five years. The proportion of crashes is slightly lower for BB firms (between 10% and 17%). Thus, even with this stricter definition of survival, the majority of the OTC firms survive for more than 5 years.

4.5. Trading Activity

Table 5 presents statistics on the proportion of trading days as well as on average daily trading volume in USD (measured on non-zero trading volume days only). Panels A and B report these statistics by sample group, which are averaged at the firm level over the sample period. Panels C and D provide these statistics at the firm-month level by venue.

Panel A shows that the mean (median) proportion of trading days is 45.89% (42.35%) across all OTC sample firms. Firms in the *In OTC only (start in 2001)* category tend to be traded least frequently (median: 28.43%), while firms in the *Rising stars (new firms)* category tend to be traded most often (median: 90.10%). Panel B illustrates that mean (median) trading volume on trading days is $97,928 ($15,030) across all OTC sample firms, which is low. However, volume is not much higher for NASDAQ SCM stocks (mean: $152,558; median: $64,490). Similar to Panel A, firms that remain in the OTC market throughout display the lowest, and rising stars the highest, trading volumes.

[19] Panel D focuses on existing sample firms that are not flagged as having crashed at the beginning of the tracking period. The number of firms in Panel D is therefore lower than in Panel B.

Panels C and D show that trading activity also varies significantly across venues. For example, the mean proportion of trading days (daily trading volume) is 39.27% ($26,886) for Pink Sheets firms and 55.36% ($41,696) for BB firms.[20] These statistics are consistent with Ang et al. (2013) who report a mean proportion of trading days of 53% across their sample of OTC stocks (see also Bollen and Christie, 2009). Taken together, the analysis in Table 5 shows that trading activity is generally low in the OTC market but that it varies predictably across sample groups and venues. By and large, more regulated venues have more actively traded securities.

5. Regression Analysis of Market Quality

5.1. Trading Venues

We first examine whether market liquidity and price efficiency differ across OTC venues. Based on the information and regulatory requirements described in Section 3, we expect that venues can be ranked in terms of market liquidity and price efficiency, with AMEX, NASDAQ and NYSE (*Exchange*) being ranked highest, followed by the Small Cap Market (*SCM*), the Bulletin Board (*BB*), the Pink Sheets, and the Grey Market.

Table 6 presents results from regressions that relate market liquidity (Panel A) and price efficiency (Panel B) proxies to venue dummy variables and controls. We use two liquidity proxies: the proportion of zero return days as proposed by Lesmond et al. (1999) and share turnover following the findings in Ibbotson et al (2012).[21] For price efficiency, we use the

[20] Note that daily trading volume in Panel B (Panel D) is averaged at the firm level (at the firm-month level). Since firm-level trading volume tends to be clustered in a few months, the distribution is much more skewed in Panel D than in Panel B. The P25, P50 and P75 statistics across all observations are therefore much higher in Panel B than in Panel D.

[21] We run robustness tests with other liquidity proxies: proportion of zero volume days, trading volume, the Amihud (2002) measure, and bid-ask spreads. The results are qualitatively similar.

absolute return autocorrelation as well as the negative coefficient of return skewness. A positive return autocorrelation implies that prices underreact to information, while a negative return autocorrelation implies overreaction. The absolute value of the return autocorrelation thus captures inefficiency in price adjustment relative to an ideal value of zero. Hong and Stein (2003) show that, when investors have divergent opinions, short-sale constraints can lead to sustained periods of artificially high stock prices followed by crashes. Such inefficiencies and corrections will show up in the data as negative skewness. Following Chen et al. (2001), we rely on the negative value of return skewness as a measure of crash risk.

The liquidity and efficiency proxies are estimated as follows: (i) the proportion of zero return days is the share of trading days with zero returns over the current month; (ii) share turnover is the average number of shares traded divided by the number of shares outstanding over the current month; (iii) autocorrelation is measured as the absolute value of the weekly autocorrelation of stock returns over the past three months (including the current month);[22] (iv) negative skewness is the negative coefficient of skewness (i.e., the negative of the third moment of daily returns divided by the standard deviation of daily returns raised to the third power) estimated over the past six months (including the current month). Appendix 3 provides descriptive statistics on these proxies by venue and reporting status.

We use lagged *Log(Market value)* and lagged *Return volatility* as control variables in the market liquidity regressions. For the efficiency proxies, we follow Chen et al. (2001) and include lagged *Log(Market value)*, lagged *Return volatility*, lagged *Share turnover* and lagged

[22] The estimation of the autocorrelation measure is confined to current weeks with non-zero returns.

Cumulative return as controls. In addition, all regressions include price-level dummy variables that indicate whether the lagged stock price is below $0.01, $0.10 or $1.00.

The analyses are either based on 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 month-year and either industry- or firm-fixed effects. The t-statistics are based on standard errors clustered by firm in this and all subsequent regression analyses.[23]

Panel A reports the associations between our two liquidity proxies and venues. The estimated coefficients on venue dummies are highly significant with the expected signs and relative magnitudes. The coefficient estimates indicate that firms trading on the *Exchanges* or the *SCM* are more liquid than firms trading on the *BB*. Stocks that are on the *BB* (and the Pink Sheets), in turn, are more liquid than stocks that are solely on the *Pink Sheets*. Stocks in the *Grey Market* (the omitted category) are the least liquid. The coefficient estimates are similar whether we include industry- or firm-fixed effects. Hence, unobserved firm-level heterogeneity has a limited effect on the association between venues and market liquidity. The control variables are significant and load as expected. Specifically, market value and return volatility (which in our setting likely captures trading activity) are positively associated with liquidity, regardless of trading venue.

[23] Regressions with two-way clustered standard errors by firm and month yield similar results with slightly lower t-statistics. However, since the number of clusters is limited in the time dimension, it is not clear whether two-way clustered standard errors are less biased than one-way clustered standard errors (Petersen, 2009).

Panel B reports the associations between our two price efficiency measures and venues. Again, the estimated venue coefficients are highly significant with the expected signs. That is, price efficiency increases with the informational and regulatory requirements of the venues, even after controlling for characteristics such as market value, return volatility, stock performance, and share turnover. These conclusions are generally robust to using industry- or firm-fixed effects. The controls load significantly with the expected sign and are broadly consistent with Chen et al. (2001).

In summary, the analysis shows that higher-ranked trading venues are associated with significantly better market liquidity and price efficiency.

5.2. SEC Disclosure Filings and Securities Manuals

We next examine whether firms' disclosure of information provides additional benefits in terms of market liquidity and price efficiency beyond those associated with a particular trading venue. We focus on SEC disclosure filings and a firm's inclusion in two prominent securities manuals (Mergent's Manual and S&P Corporation Records). Both types of disclosure provide potential investors with basic information about OTC firms' financial health and operations.

Table 7 presents results from regressions that relate market liquidity (Panels A and B) and price efficiency (Panels C and D) to venues, *SEC* filing status and *Manual* inclusion. All regressions are estimated at the firm-month level and include month-year and either industry- or firm-fixed effects. The analyses are based on the NASDAQ venue history and include observations from all venues or from the NBB only (i.e., Pink Quote and Grey Market). We estimate separate regressions based on the full sample or on a propensity-matched sample. The

propensity match is with respect to either SEC filing or manual inclusion, and based on market value, return volatility and stock price, each lagged by six months, as well as industry, state of headquarters and year.

Panels A and B report the results for our liquidity proxies. In the first two columns of each panel, we find that firms that are covered by a securities manual have significantly fewer zero return days and have significantly higher turnover, even after controlling for venue and firm characteristics. Similarly, firms that file with the SEC enjoy significantly higher market liquidity, both in terms of fewer zero return days and higher turnover.

The next set of columns in Panels A and B estimate the same panel regressions for NBB firms only. Note that the magnitude of the effect of manual inclusion is now larger than for the full sample. This result is intuitive given that these firms are not required to file with the SEC; thus, a manual publication is likely to play a larger role. The final set of columns in Panel A show that the results for manual inclusion and SEC filing status are generally robust to replacing the industry- with firm-fixed effects. However, the coefficient estimates tend to be attenuated with propensity matching and/or firm-fixed effects, emphasizing the importance of controlling for unobserved firm-level heterogeneity.

Panels C and D report the results for our price efficiency proxies. While the effect of manual inclusion on these proxies appears to be tenuous, the coefficient estimates on *SEC* are significantly negative in all specifications. The effect of SEC filing is robust across samples (i.e., all venues versus NBB only; full sample versus propensity matched sample) and becomes even stronger when we replace industry- with firm-fixed effects.

In summary, the results suggest that SEC filings are associated with higher market liquidity and price efficiency. For manual inclusion, the association is confined to the liquidity measures. These findings are consistent with the notion that disclosure improves market quality.

5.3. State Securities Laws

Publicly traded stocks in the U.S. OTC markets for which the issuer is not an SEC registrant are subject to state regulation. In this subsection, we examine whether differences in state securities regulation are associated with market liquidity and price efficiency. Since stringent merit reviews have the potential of screening out bad firms, we hypothesize that firms headquartered in states with tougher merit reviews enjoy better liquidity and price efficiency.

To capture differences in the toughness of states' merit reviews stipulated by state securities laws, we use *Merit review*, which is an average of three scores for the strictness of state merit reviews.[24] The models are estimated exclusively for NBB and BB firms as exchange-traded firms are exempt from state securities laws. We assign blue sky laws according to the state of each firm's headquarters as most states require home-state registration and trades are likely to often involve buyers and sellers in the home state. We cannot include firm-fixed effects because the state of headquarters is constant for almost all the firms. We therefore use industry- and month-year fixed effects.

[24] We combine scores from three sources: (1) A law firm specializing in blue sky laws, Nancy Fallon-Houle (www.nfhlaw.com), tabulates merit review for Regulation A filings on a scale from 0 to 3; (2) Wolters Kluwer Tax & Accounting's CCH Intelliconnect ranks merit reviews for S-33 filings participating in the North American Securities Administrators Association's Coordinated Equity Review Program on a scale from 0 to 3; and (3) The Small Business Guide codes SCOR merit reviews on a scale from 0 to 3. In the empirical analysis, we use the simple average of these three scores as a measure of the strictness of merit reviews. Our results are robust to replacing the average with individual indicators for the strictness of merit reviews.

Table 8 presents two specifications for each outcome variable. The first specification adds the proxy for the strictness of state merit reviews to the model from the previous subsection. The second specification estimates separate coefficients on *Merit Review* and *Manual* for states with and without a manual exemption. This specification is based on the notion that state merit reviews (manual inclusion) should matter more (less) in states that do not offer a manual exemption. For each specification, we also estimate a regression adding a dummy variable *SoInc ≠ SoHqt* that is one when the state of a firm's headquarters is not the same as its state of incorporation. Since firms that incorporate outside their home state are probably different (e.g., more sophisticated) than firms that do not, this control is intended to capture unobserved firm characteristics (see also Litvak, 2011).

Panel A reports results for our liquidity proxies. The coefficient estimate on Merit review is significantly negative (positive) for the proportion of zero return days (share turnover) suggesting that firms headquartered in states with tougher merit review laws have more liquid stocks. For share turnover, the coefficient estimate on *Merit review* (*Manual*) is significant only in states without (with) the manual exemption. These two results line up with the role of manual exemptions in state securities laws. Adding the control variable *SoInc ≠ SoHqt* has little impact on the main results. However, it has a significantly positive association with the liquidity proxies confirming that firms incorporated outside the state of their headquarters differ from the rest (consistent with Litvak, 2011).

Panel B presents the results for autocorrelation and negative skewness. The coefficient estimate on *Merit Review* has the expected negative sign in the autocorrelation regressions but is only marginally significant. The association between the strictness of merit reviews and negative

skewness is stronger, especially when the *SoInc ≠ SoHqt* control variable is included. This effect is mainly driven by firms from states without the manual exemption, which is consistent with our expectations. Similar to the results presented in the previous subsection, the association between *Manual* and the price efficiency proxies is not significant at conventional levels.

Taken together, the results suggest that stricter merit reviews at the state level are associated with higher market liquidity and, to some extent, with greater price efficiency. These findings lend support to the interpretation that state securities laws matter in the OTC market.

5.4. Pink Sheets Information Tiers and Caveat Emptor Label

In August 2007, the Pink Sheets introduced tiers and labels differentiating firms by their information status as well as creating a Caveat Emptor flag for firms with public interest concerns (e.g., because there are promotional activities).[25] Designations are monitored by the Pink Sheets operator and modified if information availability for a firm changes. We examine differences in market liquidity and price efficiency across these tiers and information labels.[26]

The analyses are based on the PS tier history (period: October 2007 to October 2010) and include only observations from the NBB (i.e., Pink Quote and Grey Market). All regressions are estimated at the firm-month level and include month-year and firm-fixed effects. We distinguish between the information regimes by adding dummy variables for firms in the *Pink No Info*, *Pink*

[25] See Section 3 and Appendix 1.1 for more details.

[26] Jiang et al. (2012) 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 investors have some ability to predict how firms will be classified. Frieder and Zittrain (2007) provide evidence of strong spam price effects in Pink Sheets stocks.

Limited Info and *Pink Current Info* tiers, with Grey Market firms being the omitted category. In addition, we include a dummy variable indicating a *Caveat Emptor* flag. The set of controls is the same as in the previous analyses (e.g., Table 7) with one exception: We do not add a separate *SEC* dummy variable, because the Pink Sheets automatically assign SEC filers to the Pink Current Info tier. However, since some firms in the current information category are not SEC filers, we run separate regressions that include the interaction term *Pink Current Info* × *SEC* to examine differential effects for firms providing current information with and without SEC filing.

Table 9 presents the results. The four columns on the left suggest that market liquidity is positively associated with the information status of the firms as captured by the Pink Sheets tier. Specifically, liquidity decreases monotonically from stocks in the Pink Current Information category, to stocks in the Pink Limited Information tier, to stocks in the Pink No Information category and then to Grey Market firms. Based on the proportion of zero returns, firms with a Caveat Emptor label are even less liquid than Grey Market stocks. Interestingly, the coefficient estimate on *Manual* is smaller than in the previous analyses (e.g., Table 7). The most likely explanation is that the Pink Sheets tier designations reflect similar information as the securities manuals (and that the former are measured in a more timely fashion based on the PS tier history). The interaction term *Pink Current Info* × *SEC* does not have a consistent sign across the two liquidity proxies and hence is difficult to interpret.

The four rightmost columns in Table 9 illustrate that price efficiency, as measured by autocorrelation and negative skewness, also increases monotonically with the Pink Sheets information tiers. *Caveat Emptor* stocks have the most negatively skewed returns, indicative of a relatively high crash risk and consistent with the label's purpose. The interaction term *Pink*

Current Info × *SEC* is not significant. Consistent with the previous analyses in Tables 7 and 8, there is also no significant association between manual inclusion and price efficiency.

Taken together, the analyses in this subsection provide evidence that the Pink Sheets information tiers map into significant market liquidity and price efficiency differences. The tier indicators largely subsume the effects associated with indicators for SEC filing status and manual inclusion.

5.5. Regime Changes in the Pink Sheets

In this section, we examine the effects of several regime changes in the Pink Sheets that were aimed at enhancing transparency in this market. Such changes could affect the relative attractiveness of the Pink Sheets and also speak to the role of (tighter) information regimes in the OTC market. A first indication that these regime changes have played a role is the steady decline of firms that are traded solely on the BB but not the Pink Sheets.[27]

To analyze the regime changes more formally, we consider four major Pink Sheets initiatives and 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 finally to 1.00 (as of April 2010).[28] To capture the effects of these regime changes on BB firms relative to Pink Sheets firms, we introduce the interaction term *BB* × *Regime index*.

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[27] Untabulated analyses show that the fraction of BB-only firms has been fairly stable, fluctuating between 5% and 10%, since the middle of 2003 (which is when we start to have reliable data that allow us to make this distinction). Starting in August 2007, the fraction declines and falls below 1% in 2010. By October 2010, there are 8 BB-only firms left in our sample.

[28] 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 Appendix 1.1).

Table 10 presents results from regressions that relate our market liquidity measures (Panel A) and our price efficiency proxies (Panel B) to the *BB* indicator and the interaction term between *BB* and *Regime Index*. In addition, we include the *SEC* and *Manual* dummy variables as well as the controls from the regressions in the previous subsections. The analyses are either based on BB and NBB firm-month observations from the NASDAQ venue history (period: January 2001 to October 2010) or on a subsample of BB and Pink Sheets firm-month observations from the PS venue history (period: February 2003 to October 2010). We present models with month-year and either industry- or firm-fixed effects. Thus, all models include a flexible time trend to capture general and unrelated changes in the Pink Sheets market.

Panel A shows that market liquidity is generally higher for BB firms. However, the coefficient estimate on the interaction term is positive (negative) for the zero return measure (share turnover), 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 or even negative in some specifications suggesting that, by October 2010, Pink Sheets stocks exhibit the same, if not better, market liquidity as BB firms.

Panel B illustrates that the results for our price efficiency proxies are very similar to those presented in Panel A. Specifically, BB stocks initially have lower return autocorrelations and less negatively skewed returns than Pink Sheets stocks. However, stocks solely quoted in the Pink Sheets catch up over time and, by the end of the sample period, price efficiency is similar to BB stocks, except in one specification.

Overall, the results in Table 10 show that the liquidity and price efficiency advantage of dually quoted BB stocks relative to stocks that are solely quoted in the Pink Sheets has declined

over time. In most cases, the advantage seems to have disappeared as a result of the regime changes in the Pink Sheets.

5.6. Information Regimes and Return Performance

The previous analyses show that market quality varies systematically across the OTC information regimes. A natural question is whether return performance also differs across the regimes. We assess performance by estimating alphas for portfolios of stocks in the various information regimes using a standard asset pricing model. In each month, we collect stocks belonging to each information regime, and compute equally-weighted and value-weighted returns for this portfolio. For instance, we take all the stocks that are in the Pink Sheets, non-SEC filers and not covered in a manual, and compute the returns for this portfolio in every month. Stocks can switch regimes and we drop such stock-month observations when we compute the portfolio returns. As in Ang et al. (2013), we estimate a five-factor model including the market, SMB, HML, Momentum, and Pastor-Stambaugh (2003) liquidity factors.[29] In order to account for thin trading, we include three lags of each factor in addition to the contemporaneous value.[30]

Table 11 reports the alpha estimates. There are two main conclusions from this analysis. First, both sets of alphas suggest severe underperformance for OTC stocks, also relative to SCM stocks. The alphas are in the region of -5% per month for OTC stocks. This underperformance

[29] 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 of OTC stocks across information regimes.

[30] The models are estimated using log returns given the relative large frequency of extreme returns (see Figure 2). 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 discrete returns.

confirms results in Eraker and Ready (2013). The negative alphas are also consistent with the distribution of raw returns for OTC stocks (e.g., as reported in Table 3, Panel C).

Second, the alphas are similar across OTC information regimes. In the Pink Sheets, the alphas for SEC filers are no larger than those for non-filers (e.g., for firms not covered in a manual, the alpha is -4.8% for non-SEC filers versus -4.9% for SEC filers). Moreover, the alphas for stocks with and without manual coverage are generally very similar.

Thus, in contrast to our market quality results, the information regimes in the OTC market do not appear to be associated with differential return performance. Likely explanations are the factors discussed extensively by Eraker and Ready (2013) and Ang et al. (2013), e.g., retail investors seeking securities with lottery-like payoffs and the presence of short-sale constraints. In response to such conditions more sophisticated investors may simply refrain from trading, which in turn makes it harder for prices and hence returns to reflect differences in information regimes. We conjecture that it is precisely this lower investor participation that manifests itself in lower market liquidity.

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 and file 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 corporate and securities laws as well as venue-based rules stipulating disclosures, and hence not necessarily dark. The OTC market is therefore a twilight zone of different regulatory and information regimes.

Given how little is known about the OTC market, we first characterize firms and regulatory regimes in this market. We provide descriptive statistics on market 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, on average have negative returns and exhibit high return volatilities. We show that a significant fraction of stocks enter the OTC market without having been listed on 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, even when they enter the market due to a delisting from an exchange.

After this characterization, we examine the role of venues and relevant regulatory regimes for market liquidity and price efficiency. We show that OTC firms that file disclosures with the SEC, publish information in a recognized securities manual, are headquartered in states with stricter merit reviews, and are in higher-level Pink Sheet information tiers are traded more frequently, and have higher share turnover, less return autocorrelation and less negatively skewed returns. In short, we find that differences in OTC regulatory and information regimes map into differences in market liquidity and price efficiency. This finding suggests that *at least some* investors recognize information differences across the OTC regimes when trading. Thus, our study contributes to a more nuanced understanding of investor behavior in the OTC markets. Standard economic theory on information asymmetry and adverse selection appears to still hold in OTC market trading. This conclusion is not at odds with the asset pricing results in Eraker and Ready (2013) and Ang et al (2013). Their studies suggest that behavioral biases by retail investors, gradual diffusion of information, and short-sale constraints explain why OTC stocks consistently underperform and display very different return characteristics than listed stocks do

(e.g., lottery characteristics). In light of these conditions, more sophisticated investors may simply abstain from trading stocks for which information problems are severe, leading to differences in investor participation and hence market quality.

Our paper also 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 alternative regimes for information provision 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 secondary trading, market liquidity and price efficiency.

In closing, we add a few cautionary words about the interpretation of our results. Identifying the causal effects of OTC regulatory regimes is very difficult because firms choose their trading venue, state of headquarters, manual publication and, to some extent, whether or not they file with SEC. For this reason, many of our regressions include firm-fixed effects to account for unobserved heterogeneity. But it is of course possible that changes in firms' economics over time drive changes in SEC filing, manual publication or Pink Sheets tier status and, at the same time, affect market liquidity and price efficiency in ways that we have not controlled for. This is why we interpret the regression results as associations, rather than causal effects.

Appendix 1: Institutional details

The first part of the Appendix provides further institutional details on the regulatory regimes that govern the OTC market.

1.1 Pink Sheet Tiers

Starting in 2007, the Pink Sheets introduced a tier system for companies whose stock is quoted on its platform.[31] 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 traded on this tier, companies undergo a qualitative review by the Pink Sheets operator (now called the OTC Markets Group). 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, U.S. companies must be ongoing operations; i.e., they cannot be shells or be in bankruptcy. As the number of U.S. firms in this tier is still very small, 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. By contrast, securities in the OTC Pink tier have no SEC or equivalent reporting requirements. 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 little 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

[31] This section draws on information from www.otcmarkets.com/investors/otc-market-tiers.

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 are classified and labeled as Caveat Emptor (Buyer Beware).

1.2 State Securities (Blue Sky Laws)

State securities laws predate the 1933 and 1934 Acts. While the 1933 and 1934 Acts are based on a disclosure regime, state securities laws rely on a merit-based regime.[32] 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 initiatives have to some extent preempted blue sky laws.[33] 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 38.

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.

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[32] 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.

[33] 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"), the 2002 Sarbanes-Oxley Act ("SOX"), and the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank").

Securities Registration

There are four types of state securities registration: coordination, notification, Small Corporation Offering (SCOR), and qualification.[34] 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 equity securities registered under the Exchange Act of 1934 that is widely held and that can show evidence that it meets certain minimum standards.[35] 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.[36] 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.[37] 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.

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[34] 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.

[35] 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 dividends or defaulted on any bond or long-term lease; and that the price of the offered security is no less than $5.00.

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

[37] 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.

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.[38] 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 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:[39] However, the adoption of the USA 2002 exemptions varies significantly across states.

One effective 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 and these two manuals are explicitly recognized in 36 states. Five more states allow a nationally recognized manual without mentioning a particular one and one state recognizes Fitch's manual. To be covered in Mergent's manual, for instance, the firm pays an initial listing fee of $3,600 and an annual renewal fee of $975.

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[38] 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.

[39] 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).

The manuals include a company profile which lists company narratives including 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 relation contact, 5-year stock pricing range, and the number of employees.

The manuals are available in print form and via online access 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.[40] Thus, a manual listing significantly enhances information disclosures to potential investors as well as enlarges the pool of investors for which secondary trading would be permitted.

1.3 State Corporate Laws

State corporate laws may also contain disclosure 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 information disclosure 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), fifteen states require the automatic provision of annual reports and 25 states require companies to furnish an annual report only upon receipt of a written shareholder request. The other states do not require financial disclosure. Of the states with some disclosure requirement, sixteen 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.

[40] Exceptions are Alabama, California, Illinois, Kentucky, Louisiana, Missouri, New York, Ohio, Pennsylvania, Tennessee, Vermont, and Virginia.

Appendix 2: Example Firms

This appendix provides details on six typical OTC firms. For each firm, we state its sample group (as defined in Table 1) and describe its main business (as of April 2013, 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.

2.1 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 before it became dually quoted on the 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 report any 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 it would voluntarily terminate its 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 (which are certified by its attorney) despite being no longer registered with the SEC. Since February 2010, the firm has been covered in the S&P securities manual.

2.2 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 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). This website, which provides no financial information, calls itself a "blog" and 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 listed in the S&P or Mergent manual. In September 2010, the SEC charged Quri with orchestrating a "pump and dump" scheme.[41] The SEC alleges that the firm issued several false and misleading press releases about impending acquisitions between February and June 2009, allowing the CEO Jaime Gomez to sell shares at inflated prices for a total gain of $27,100.

2.3 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.

[41] See http://www.sec.gov/litigation/complaints/2010/comp21675.pdf.

2.4 Miracor Diagnostics, Inc. (Fallen angel)

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 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.[42] 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, 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, the firm was removed from the BB and traded exclusively in the Pink Sheets, after it filed for bankruptcy and stopped reporting. Consequently, its Pink Sheets 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 the Mergent securities 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.

2.5 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

[42] 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 Cytoprobe in 1992, to Medical Device Technologies in April 1995, and to Miracor in October 1999.

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 (which are also available on the firm's website). It has not been covered by the securities manuals.

2.6 Broadwind Energy (Rising star)

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. The firm was listed in Mergent's securities manual as of January 2009 and in the S&P manual as of July 2009.

Appendix 3: Descriptive statistics for dependent variables

Panel A: Proportion of zero return days

Venue	SEC filing	Manual	# Firm months	# Firms	Mean	StDev	P25	P50	P75
NBB	no	no	257,190	5,429	0.8588	0.2188	0.8095	0.9524	1.0000
		yes	18,888	1,962	0.7464	0.2596	0.5909	0.8421	0.9545
NBB	yes	no	30,286	2,891	0.7536	0.2742	0.5789	0.8636	1.0000
		yes	19,922	2,335	0.6773	0.2897	0.4545	0.7619	0.9500
BB	required	no	191,434	5,350	0.6012	0.3067	0.3333	0.6500	0.8947
		yes	112,045	3,801	0.5353	0.2909	0.2857	0.5455	0.8000
SCM	required	no	7,912	448	0.2608	0.2288	0.0870	0.1905	0.4091
		yes	32,990	1,016	0.2587	0.2385	0.0500	0.1905	0.4091
Exchange	required	no	24,478	981	0.1639	0.1989	0.0000	0.0952	0.2381
		yes	45,899	1,386	0.1261	0.1688	0.0000	0.0500	0.1739
Total			741,044	9,715	0.6299	0.3438	0.3158	0.7273	0.9524

Panel B: Share turnover

Venue	SEC filing	Manual	# Firm months	# Firms	Mean	StDev	P25	P50	P75
NBB	no	no	254,456	5,419	0.0762	0.2541	0.0000	0.0050	0.0386
		yes	18,781	1,957	0.1118	0.2707	0.0034	0.0246	0.0967
NBB	yes	no	30,051	2,885	0.0984	0.2716	0.0004	0.0123	0.0697
		yes	19,761	2,322	0.1422	0.3164	0.0037	0.0311	0.1258
BB	required	no	189,350	5,342	0.1515	0.3280	0.0065	0.0377	0.1397
		yes	111,185	3,799	0.1463	0.2934	0.0142	0.0500	0.1447
SCM	required	no	7,754	447	0.2756	0.4113	0.0525	0.1264	0.3034
		yes	32,310	1,016	0.2658	0.4218	0.0420	0.1087	0.2860
Exchange	required	no	24,136	980	0.3797	0.4805	0.0851	0.2041	0.4688
		yes	44,864	1,384	0.4724	0.5542	0.1012	0.2611	0.6236
Total			732,648	9,707	0.1546	0.3433	0.0030	0.0310	0.1356

Panel C: Autocorrelation

Venue	SEC filing	Manual	# Firm months	# Firms	Mean	StDev	P25	P50	P75
NBB	no	no	91,450	4,625	0.4012	0.2539	0.1864	0.3782	0.5908
		yes	11,746	1,633	0.3780	0.2476	0.1682	0.3499	0.5622
NBB	yes	no	17,135	2,287	0.3709	0.2423	0.1665	0.3438	0.5485
		yes	14,010	2,086	0.3580	0.2390	0.1570	0.3270	0.5284
BB	required	no	146,297	5,056	0.3339	0.2257	0.1462	0.3026	0.4900
		yes	97,771	3,653	0.3330	0.2228	0.1477	0.3039	0.4891
SCM	required	no	7,365	432	0.2808	0.1902	0.1259	0.2518	0.4110
		yes	31,102	995	0.2823	0.1932	0.1224	0.2538	0.4146
Exchange	required	no	22,772	943	0.2547	0.1801	0.1067	0.2242	0.3712
		yes	43,247	1,347	0.2495	0.1779	0.1031	0.2184	0.3666
Total			482,895	9,291	0.3341	0.2288	0.1442	0.3000	0.4910

Panel D: Negative skewness

Venue	SEC filing	Manual	# Firm months	# Firms	Mean	StDev	P25	P50	P75
NBB	no	no	232,045	5,373	0.2455	3.1037	-0.5861	-0.0707	0.5578
		yes	17,535	1,939	0.1962	2.4049	-0.5893	-0.0167	0.6576
NBB	yes	no	27,077	2,722	0.2023	2.7837	-0.6365	-0.0564	0.6603
		yes	18,599	2,257	0.2976	2.4559	-0.5475	0.0165	0.8223
BB	required	no	166,124	5,023	-0.1783	2.1005	-0.7755	-0.1833	0.3394
		yes	104,866	3,666	-0.1640	1.5749	-0.6800	-0.1770	0.2806
SCM	required	no	6,840	406	-0.3585	1.2555	-0.7411	-0.2322	0.1756
		yes	29,680	952	-0.3537	1.2453	-0.7423	-0.2349	0.1626
Exchange	required	no	21,083	907	-0.1056	1.4530	-0.6754	-0.2036	0.2661
		yes	41,176	1,271	-0.1412	1.3823	-0.6702	-0.1906	0.2577
Total			665,025	9,592	0.0054	2.4101	-0.6835	-0.1271	0.3767

The tables present descriptive statistics for the liquidity and efficiency proxies used in regression analyses in Tables 6-10. The number of firm month observations matches the number of observations in Table 6 (i.e., we required the respective control variables to be available). See Table 6 for details on the definitions and computation of the dependent variables.

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Figure 1: Regulatory Regimes in the OTC Market

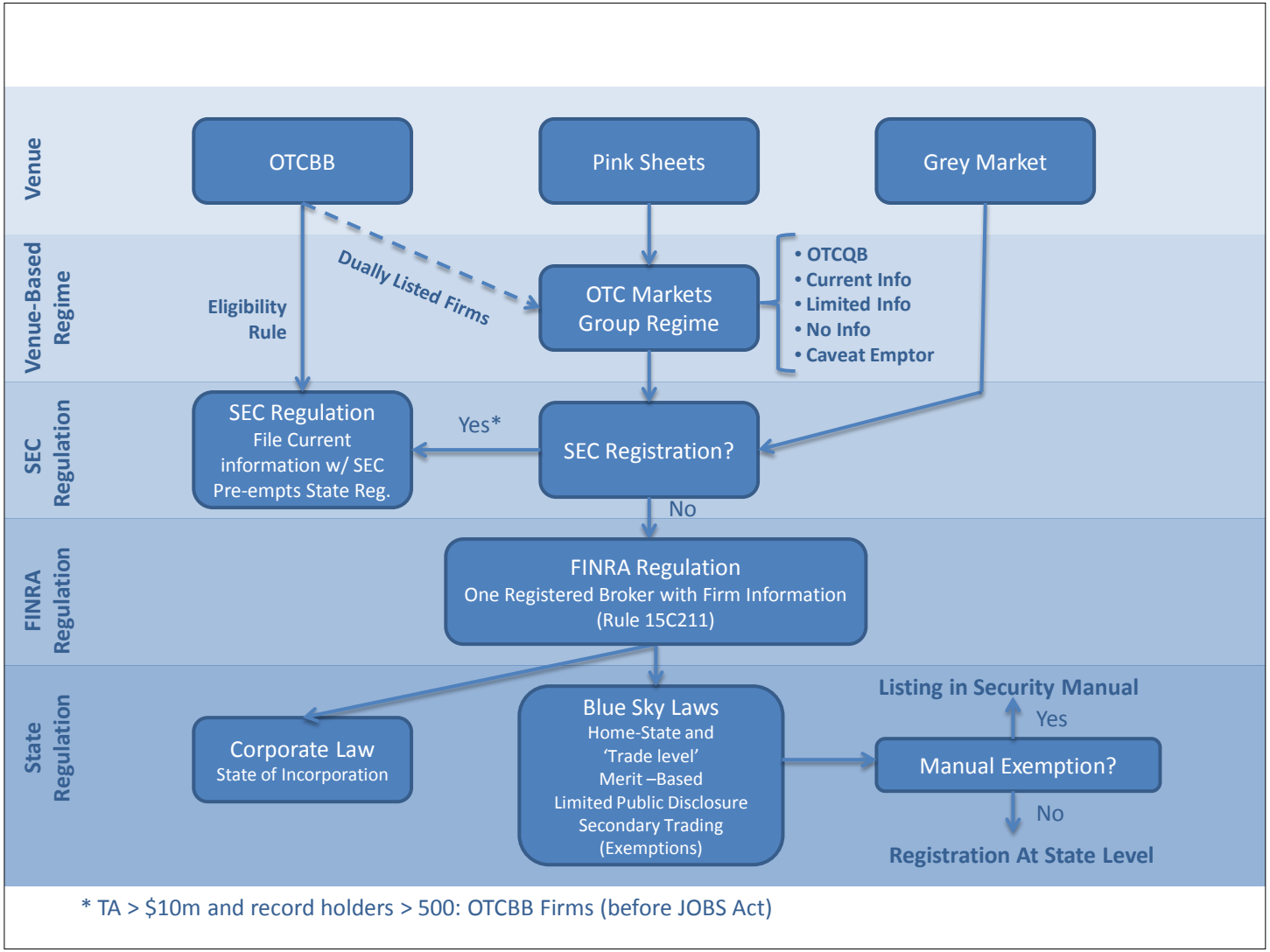
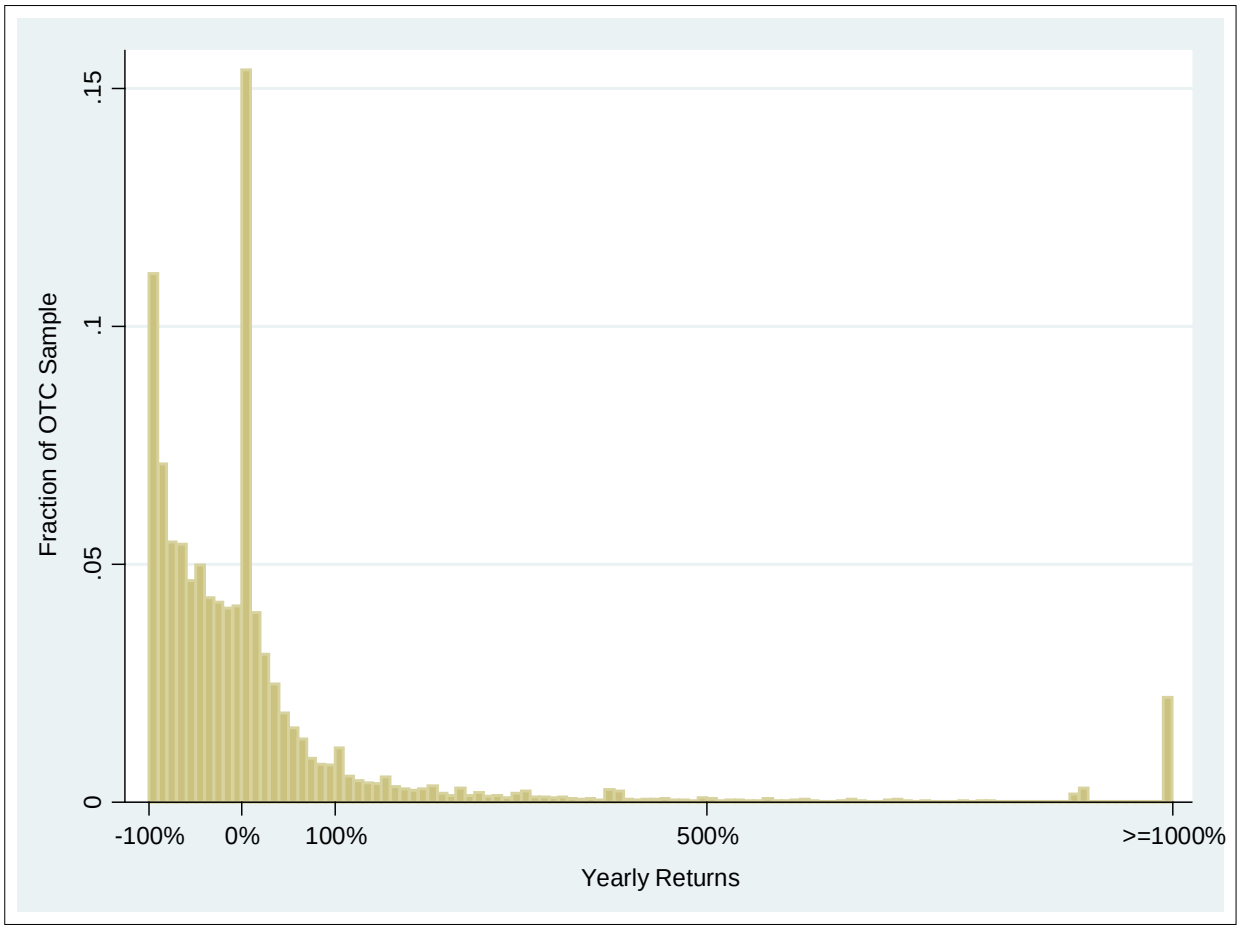


Figure 2: Stock Returns in the OTC Market



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

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 USA	4,114
- 20F filers	26
- REITs	91
- Firms with DS time series < 50 days	603
- Rarely traded firms	1,328
Final sample (Jan 2001- Oct 2010)	10,803

Panel B: Sample group classification

Sample group	# Firms	Share
In OTC only (start in 2001)	5,016	47%
New firms (remain in OTC)	3,134	30%
Rising stars (start in 2001)	370	3%
Rising stars (new firms)	276	3%
Fallen angels (from exchange)	1,787	17%
Total OTC	10,583	100%
Benchmark: NASDAQ Small Cap	220	
Total Sample	10,803	

Panel C: Dark firms across sample groups

Sample group	Dark firms	SEC at some point		Manual at some point	
	# Firms	# Firms	Share SEC filing while in OTC	# Firms	Share Manual Coverage while in OTC
In OTC only (start in 2001)	1,407	3,501	59%	2,104	24%
New firms (remain in OTC)	719	2,373	80%	1,006	18%
Rising stars (start in 2001)	0	370	88%	309	31%
Rising stars (new firms)	0	276	86%	222	26%
Fallen angels (from exchange)	0	1,787	43%	1,605	39%
Total OTC	2,126	8,307	63%	5,246	24%
Benchmark: NASDAQ SCM	0	220	-	206	-
Total Sample	2,126	8,527	-	5,452	-

This table presents the sample selection process (Panel A) and the composition of various sample groups (Panels B and C). The final sample comprises 10,803 firms and covers the period January 2001 to October 2010. The sample groups are defined as follows: *In OTC only (start in 2001)* includes firms that trade in the OTC market throughout 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. *Rising stars (start in 2001)* are firms that are in the OTC market as of January 2001 but subsequently trade up to traditional exchanges (AMEX, NASDAQ or NYSE) or the NASDAQ Small Cap market. *Rising stars (new firms)* enter the sample after January 2001 as OTC firms and later trade up. *Fallen angels (from exchange)* are firms that enter the sample by delisting from the traditional exchanges and trading down to the OTC market (either in January 2001 or afterwards). The benchmark group *NASDAQ Small Cap* comprises firms that remain on the NASDAQ Small Cap market throughout. In Panel C, we define dark firms as firms that never file with the SEC and never appear in Mergent's Manual or the Standard & Poor's Corporation Records.

Table 2: Industry, State of Headquarters and State of Incorporation by Sample Group

Panel A: Broad industry categories by sample group

Industry group	Sample group													
	In OTC only (start in 2001)		New firms (remain in OTC)		Rising stars (start in 2001)		Rising stars (new firms)		Fallen angels (from exchange)		Total OTC		Benchmark: NASDAQ SCM	
	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share	# Firms	Share
Basic industries	173	3%	98	3%	14	4%	23	8%	88	5%	396	4%	7	3%
Cyclical consumer goods	106	2%	59	2%	9	2%	12	4%	59	3%	245	2%	7	3%
Cyclical services	894	18%	540	17%	35	9%	55	20%	404	23%	1,928	18%	21	10%
Financials	1,659	33%	1,179	38%	130	35%	35	13%	239	13%	3,242	31%	115	52%
General industrials	383	8%	141	4%	24	6%	26	9%	161	9%	735	7%	12	5%
Information technology	615	12%	289	9%	31	8%	21	8%	410	23%	1,366	13%	18	8%
Non-cyclical consumer	558	11%	331	11%	74	20%	52	19%	262	15%	1,277	12%	30	14%
Non-cyclical services	114	2%	63	2%	5	1%	18	7%	81	5%	281	3%	1	0%
Resources	362	7%	321	10%	43	12%	21	8%	51	3%	798	8%	8	4%
Unclassified	9	0%	9	0%	0	0%	0	0%	2	0%	20	0%	0	0%
Utilities	143	3%	104	3%	5	1%	13	5%	30	2%	295	3%	1	0%
Total	5,016	100%	3,134	100%	370	100%	276	100%	1,787	100%	10,583	100%	220	100%

Table 2 (continued)

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)		Rising stars (start in 2001)		Rising stars (new firms)		Fallen angels (from exchange)		Total OTC		Benchmark: NASDAQ SCM	
	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share
1	Financial Svcs	19%	Financial Svcs	25%	Banks	33%	Pharma	9%	Software	14%	Financial Svcs	17%	Banks	45%
2	Banks	12%	Banks	11%	Pharma	9%	Banks	8%	Technology	9%	Banks	11%	Health care	6%
3	Software	9%	Software	7%	Health care	7%	Retailers	5%	Banks	6%	Software	9%	Software	6%
4	Support Svcs	5%	Oil & gas	5%	Oil & gas	7%	Food	5%	Support Svcs	6%	Support Svcs	5%	Electronics	5%
5	Health care	4%	Media	5%	Software	4%	Electronics	5%	Health care	5%	Media	4%	Pharma	5%

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)		Rising stars (start in 2001)		Rising stars (new firms)		Fallen angels (from exchange)		Total OTC		Benchmark: NASDAQ SCM	
	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share
1	California	15%	California	16%	California	16%	Other country	14%	California	21%	California	17%	New York	11%
2	Florida	9%	Other country	9%	Texas	9%	California	12%	New York	10%	Florida	8%	California	10%
3	New York	8%	Florida	9%	Florida	7%	New York	11%	Texas	8%	New York	8%	Ohio	6%
4	Texas	7%	Canada	8%	New York	7%	Texas	8%	Florida	6%	Texas	7%	Florida	6%
5	Not found	5%	New York	7%	New Jersey	5%	Florida	4%	Massach.	5%	Other country	5%	N. Carolina	6%

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)		Rising stars (start in 2001)		Rising stars (new firms)		Fallen angels (from exchange)		Total OTC		Benchmark: NASDAQ SCM	
	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share	Industry	Share
1	Delaware	30%	Nevada	46%	Delaware	34%	Delaware	54%	Delaware	60%	Delaware	34%	Delaware	43%
2	Nevada	23%	Delaware	22%	Nevada	12%	Nevada	21%	Nevada	4%	Nevada	26%	Ohio	6%
3	Florida	7%	Florida	6%	California	5%	Florida	4%	California	4%	Florida	6%	Virginia	5%
4	Colorado	5%	California	5%	Florida	5%	Colorado	3%	New York	3%	California	4%	New York	5%
5	California	4%	Colorado	3%	Colorado	4%	California	3%	Florida	3%	Colorado	4%	Florida	4%

This table presents details on industry, state of headquarters and state of incorporation by sample group. Panel A provides information on broad industry categories for the full sample. Panel B shows the top 5 industries using a more detailed industry categorization by sample group. Panels C and D show the top 5 states in which OTC sample groups have their headquarters and incorporate, respectively. For details on the sample group composition, see Table 1.

Table 3: Market-based Characteristics by Sample Group

Panel A: Average market capitalization (USD) across months (volume weighted)

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	4,433	25,842,486	68,452,482	1,809,716	7,238,550	22,678,626
New firms (remain in OTC)	2,659	45,232,324	79,665,907	8,070,141	21,087,173	48,353,415
Rising stars (start in 2001)	370	132,300,000	112,500,000	47,387,900	99,475,202	189,300,000
Rising stars (new firms)	259	194,700,000	177,100,000	65,124,142	124,600,000	293,200,000
Fallen angels (from exchange)	1,776	90,542,786	125,200,000	12,100,150	36,063,789	118,100,000
Total OTC	9,497	52,123,936	98,250,939	4,656,899	16,676,756	50,221,229
Benchmark: NASDAQ SCM	220	54,290,381	54,614,188	20,104,104	38,353,974	68,975,586

Panel B: Average stock price (USD) across months (volume weighted)

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	5,015	7.81	23.15	0.12	0.48	2.13
New firms (remain in OTC)	3,134	4.96	17.08	0.35	0.92	2.46
Rising stars (start in 2001)	370	11.15	10.05	3.94	7.72	16.29
Rising stars (new firms)	267	10.21	10.01	3.75	6.53	13.77
Fallen angels (from exchange)	1,782	5.83	9.70	1.10	2.81	7.05
Total OTC	10,568	6.81	19.11	0.27	1.01	4.48
Benchmark: NASDAQ SCM	220	11.95	10.66	4.07	9.70	15.02

Panel C: Annualized returns over full sample period

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	4,914	-30.61%	36.92%	-58.41%	-34.77%	-2.16%
New firms (remain in OTC)	3,070	-18.00%	146.70%	-72.04%	-44.65%	-9.35%
Rising stars (start in 2001)	362	-0.81%	26.83%	-16.97%	1.34%	17.96%
Rising stars (new firms)	270	4.27%	47.24%	-22.26%	2.57%	23.81%
Fallen angels (from exchange)	1,751	-40.17%	32.65%	-63.44%	-44.05%	-15.92%
Total OTC	10,367	-26.54%	85.96%	-62.26%	-36.86%	-3.66%
Benchmark: NASDAQ SCM	214	18.40%	38.62%	-2.30%	10.87%	31.05%

Panel D: Volatility of monthly stock returns

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	5,016	0.3471	0.1828	0.2134	0.3767	0.4763
New firms (remain in OTC)	3,134	0.3901	0.1854	0.2624	0.4055	0.5140
Rising stars (start in 2001)	370	0.2205	0.1141	0.1154	0.2155	0.2922
Rising stars (new firms)	276	0.2415	0.1194	0.1527	0.2293	0.3190
Fallen angels (from exchange)	1,787	0.3399	0.1405	0.2430	0.3316	0.4335
Total OTC	10,583	0.3514	0.1776	0.2223	0.3657	0.4755
Benchmark: NASDAQ SCM	220	0.1378	0.0736	0.0785	0.1210	0.1876

This table presents firm-level descriptive statistics by sample group. Panel A (Panel B) provides statistics for volume-weighted average market capitalization (volume-weighted average stock price). Panel C summarizes the distribution of annualized stock returns over the full sample period. Panel D provides monthly volatility statistics. For details on the sample group composition, see Table 1.

Table 4: Survival Statistics and Venue Transitions for Existing and New Firms

Panel A: Entrances and removals

Sample group	# Firms	Start in sample		End in sample	
		= Jan 2001	> Jan 2001	< Oct 2010	= Oct 2010
In OTC only (start in 2001)	5,016	5,016	0	1,684	3,332
New firms (remain in OTC)	3,134	0	3,134	454	2,680
Rising stars (start in 2001)	370	370	0	74	296
Rising stars (new firms)	276	0	276	62	214
Fallen angels (from exchange)	1,787	1,634	153	818	969
Total OTC	10,583	7,020	3,563	3,092	7,491
Benchmark: NASDAQ SCM	220	178	42	110	110

Panel B: Venue status of existing firms across years

Venue	Sample: existing in 2001				Sample: existing in 2003				Sample: existing in 2005			
	2001		2006		2003		2008		2005		2010	
NBB	2,706	100%	2,174	80%	3,788	100%	2,895	76%	4,625	100%	2,943	64%
BB			302	11%			281	7%			232	5%
SCM/Exchange			30	1%			47	1%			46	1%
Removed			200	7%			565	15%			1,404	30%
NBB			1,095	37%			925	32%			967	36%
BB	2,961	100%	1,254	42%	2,873	100%	1,282	45%	2,688	100%	1,128	42%
SCM/Exchange			201	7%			232	8%			167	6%
Removed			411	14%			434	15%			426	16%

Panel C: Venue status of new firms across years

Venue	Sample: listing in 2001				Sample: listing in 2003				Sample: listing in 2005			
	2001		2006		2003		2008		2005		2010	
NBB	182	100%	80	44%	161	100%	70	43%	343	100%	162	47%
BB			72	40%			55	34%			75	22%
SCM/Exchange			14	8%			14	9%			14	4%
Removed			16	9%			22	14%			92	27%
NBB			34	30%			25	30%			26	20%
BB	115	100%	58	50%	83	100%	37	45%	128	100%	60	47%
SCM/Exchange			9	8%			9	11%			4	3%
Removed			14	12%			12	14%			38	30%

Panel D: Venue status and firm crashes

Venue	Sample: existing in 2001				Sample: existing in 2003				Sample: existing in 2005			
	2001		2006		2003		2008		2005		2010	
NBB	2,586	100%			2,588	100%			3,166	100%		
Alive			1,699	66%			1,902	73%			1,887	60%
Crash			700	27%			302	12%			484	15%
Removed			187	7%			384	15%			795	25%
BB	2,948	100%			2,788	100%			2,582	100%		
Alive			2,047	69%			2,071	74%			1,804	70%
Crash			491	17%			290	10%			367	14%
Removed			410	14%			427	15%			411	16%

Table 4 (continued)

This table presents survival statistics and venue transitions by OTC firms. 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 or before the end of the sample period (October 2010). These statistics are presented by sample group. For 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 or 2005, respectively. Panel C provides the same information for new firms, i.e., firms that enter the market in 2001, 2003 or 2005, respectively. The matrices illustrate whether and how the venue status changes over the subsequent five years. *NBB* includes both Pink Quote and Grey Market firms. *BB* refers to firms in the OTC Bulletin Board. *SCM/Exchange* comprises firms listed on the NASDAQ Small Cap market or on traditional exchanges (AMEX, NASDAQ or NYSE). *Removed* indicates that firms are no longer traded on any exchange or venue (including the OTC market). Panel D presents whether firms that are part of the sample in 2001, 2003 or 2005, respectively, crash (and essentially die) over the subsequent five years. *Crash* (*Alive*) includes firms that (do not) experience (i) a cumulative return of -95% at some point during the five-year window and (ii) subsequently have a stock price below 0.01 USD for at least six months.

Table 5: Trading Activity in the OTC Market

Panel A: Proportion of trading days over sample period

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	5,016	34.76%	27.94%	10.19%	28.43%	54.58%
New firms (remain in OTC)	3,134	41.21%	29.44%	13.92%	37.11%	65.23%
Rising stars (start in 2001)	370	74.91%	19.30%	60.07%	77.99%	91.67%
Rising stars (new firms)	276	83.75%	18.33%	75.17%	90.10%	98.15%
Fallen angels (from exchange)	1,787	73.45%	25.67%	54.84%	81.05%	96.93%
Total OTC	10,583	45.89%	31.94%	16.55%	42.35%	74.12%
Benchmark: NASDAQ SCM	220	75.51%	21.23%	60.77%	80.33%	93.99%

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

Sample group	# Firms	Mean	StDev	P25	P50	P75
In OTC only (start in 2001)	5,016	33,913	231,993	1,968	8,164	24,966
New firms (remain in OTC)	3,134	73,763	402,758	5,628	14,370	37,932
Rising stars (start in 2001)	370	286,858	355,732	49,393	136,344	364,515
Rising stars (new firms)	267	508,858	525,551	110,790	281,537	781,650
Fallen angels (from exchange)	1,782	219,822	375,932	13,499	47,153	239,160
Total OTC	10,569	97,928	344,903	4,215	15,030	47,316
Benchmark: NASDAQ SCM	220	152,558	232,095	34,689	64,490	156,843

Panel C: Proportion of trading days over firm month

Venue		# Firms months	Mean	StDev	P25	P50	P75
NBB	Missing	234,023	23.04%	30.60%	0.00%	9.09%	33.33%
NBB	Grey Market	29,102	14.35%	23.42%	0.00%	4.55%	18.18%
NBB	Pink Sheets	158,962	39.27%	34.53%	9.09%	28.57%	68.42%
BB		321,812	55.36%	35.87%	21.05%	57.14%	94.74%
SCM		41,584	82.77%	22.93%	70.00%	95.24%	100.00%
Exchange		75,717	94.01%	15.23%	100.00%	100.00%	100.00%
Total		861,200	46.94%	38.79%	9.09%	40.00%	90.48%

Panel D: Average daily trading volume in USD - non-zero trading volume days only

Venue		# Firms months	Mean	StDev	P25	P50	P75
NBB	Missing	153,956	31,489	483,059	18	328	3,500
NBB	Grey Market	15,824	100,863	959,519	0	11	530
NBB	Pink Sheets	136,185	26,886	254,660	60	535	4,319
BB		296,875	41,696	190,896	1,945	7,258	24,036
SCM		41,118	162,524	470,128	10,829	29,757	95,063
Exchange		67,127	578,152	996,176	28,840	124,119	606,465
Total		711,085	95,595	479,948	388	4,218	23,573

This table presents descriptive statistics for trading activity in the OTC Market. Panel A (Panel B) provide firm-level statistics on the proportion of trading days (average US$ trading volume on trading days) by sample group. For details on the sample group composition, see Table 1. Panels C and D present statistics for the same variables by venue at the firm-month level. *NBB* includes both Grey Market and Pink Sheets firms. The PS venue history allows us to separate Grey Market and Pink Sheets firms within the NBB category. The remaining firms for which this separation is not possible are flagged as *NBB Missing*. *BB* refers to firms in the OTC Bulletin Board. *SCM* comprises firms in the NASDAQ Small Cap market. *Exchange* indicates firms listed on traditional exchanges (AMEX, NASDAQ or NYSE).

Table 6: Market Liquidity and Price Efficiency – Venue Analysis

Panel A: Market liquidity measures

Independent variables	Dependent variable: Proportion of zero return days				Dependent variable: Share turnover			
	NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010		NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010	
Pink Sheets			-0.035***	-0.056***			0.052***	0.054***
			(-4.50)	(-6.96)			(8.60)	(5.66)
BB	-0.147***	-0.134***	-0.149***	-0.158***	0.053***	0.070***	0.094***	0.102***
	(-34.93)	(-39.74)	(-15.96)	(-17.58)	(15.00)	(17.64)	(12.24)	(9.91)
SCM	-0.476***	-0.358***	-0.499***	-0.395***	0.198***	0.209***	0.297***	0.272***
	(-71.52)	(-60.56)	(-43.34)	(-35.23)	(22.61)	(22.12)	(19.34)	(16.61)
Exchange	-0.514***	-0.331***	-0.495***	-0.336***	0.336***	0.248***	0.420***	0.315***
	(-85.03)	(-59.27)	(-44.39)	(-32.17)	(36.11)	(29.82)	(30.84)	(21.96)
Log(Market value$_{t-1}$)	-0.065***	-0.053***	-0.074***	-0.053***	0.022***	0.009***	0.030***	0.007***
	(-62.60)	(-57.98)	(-58.31)	(-42.39)	(20.61)	(7.69)	(19.13)	(4.09)
Return volatility$_{t-1}$	-0.049***	-0.007**	-0.044***	-0.007*	0.058***	0.038***	0.061***	0.046***
	(-12.95)	(-2.50)	(-7.56)	(-1.79)	(16.60)	(12.36)	(11.48)	(9.63)
Price-level dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes		Yes		Yes
Industry fixed effects	Yes		Yes		Yes		Yes	
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.56	0.77	0.56	0.78	0.12	0.36	0.15	0.40
# Firm months	741,044	741,044	385,635	385,635	732,648	732,648	380,663	380,663

Panel B: Price efficiency measures

Independent variables	Dependent variable: Autocorrelation				Dependent variable: Negative skewness			
	NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010		NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010	
Pink Sheets			-0.071***	-0.058***			-0.145***	-0.487***
			(-10.29)	(-5.88)			(-3.52)	(-6.34)
BB	-0.030***	-0.035***	-0.094***	-0.082***	-0.642***	-0.773***	-0.715***	-1.128***
	(-18.55)	(-16.43)	(-13.67)	(-8.24)	(-33.67)	(-30.30)	(-16.00)	(-13.55)
SCM	-0.069***	-0.063***	-0.133***	-0.111***	-0.905***	-1.101***	-1.012***	-1.494***
	(-30.06)	(-18.07)	(-18.18)	(-10.50)	(-32.69)	(-28.00)	(-18.47)	(-16.19)
Exchange	-0.072***	-0.053***	-0.130***	-0.098***	-0.704***	-1.101***	-0.828***	-1.397***
	(-31.84)	(-18.36)	(-17.95)	(-9.49)	(-26.31)	(-30.63)	(-15.68)	(-15.78)
Log(Market value$_{t-1}$)	-0.016***	-0.013***	-0.017***	-0.012***	0.036***	0.219***	0.044***	0.260***
	(-34.99)	(-21.12)	(-28.77)	(-14.62)	(7.32)	(29.00)	(6.42)	(24.51)
Return volatility$_{t-1}$	0.022***	0.020***	0.020***	0.011**	0.131***	0.008	0.179***	0.156***
	(5.68)	(4.78)	(3.91)	(2.01)	(4.20)	(0.23)	(3.97)	(3.01)
Cumulative return$_{t-1}$	-0.001*	-0.003***	0.000	-0.002**	0.254***	0.336***	0.253***	0.329***
	(-1.94)	(-4.09)	(0.07)	(-2.14)	(32.08)	(41.44)	(25.69)	(32.43)
Share turnover$_{t-1}$	-0.044***	-0.025***	-0.040***	-0.022***	-0.049***	0.022	-0.030*	0.041**
	(-34.06)	(-18.30)	(-25.46)	(-12.77)	(-3.52)	(1.51)	(-1.77)	(2.23)
Price-level dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes		Yes		Yes
Industry fixed effects	Yes		Yes		Yes		Yes	
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.06	0.12	0.07	0.13	0.03	0.12	0.03	0.13
# Firm months	482,895	482,895	275,565	275,565	665,025	665,025	361,647	361,647

Table 6 (continued)

This table presents regression analyses relating proxies for market liquidity (Panel A) and price efficiency (Panel B) to firms' trading venues. The analyses are either based on the full sample as described in Table 1 (NASDAQ venue history; period: January 2001 to October 2010) or a subsample based on the PS venue history (period: February 2003 to October 2010). All regressions are estimated at the firm-month level and include month-year and either industry- or firm-fixed effects. We use the proportion of zero return days as well as percentage share turnover as market liquidity proxies, and autocorrelation and negative skewness as price efficiency proxies. *Proportion of zero return days* is the share of trading days with zero returns over the current month. *Share turnover* is the average number of shares traded divided by the number of shares outstanding over the current month. *Autocorrelation* is measured as the absolute value of the weekly autocorrelation of stock returns over the past three months (including the current month). *Negative skewness* is the negative coefficient of skewness (i.e., the negative of the third moment of daily returns divided by the standard deviation of daily returns raised to the third power) estimated over the past six months (including the current month). The first two specifications in each panel include the following venue indicators: *BB* (i.e., OTC Bulletin Board firms), *SCM* (i.e., NASDAQ Small Cap market firms) and *Exchange* (i.e., firms listed on AMEX, NASDAQ or NYSE) with NBB firms (i.e., firms traded in Pink Quote or the Grey Market) being the omitted category. The other specifications refine the analysis by including an additional venue dummy for Pink Sheets firms resulting in Grey Market firms being the omitted category. *Log(Market value$_{t-1}$)* is the log of the median market value over the three months prior to the estimation window of the respective dependent variable. *Return volatility$_{t-1}$* is the standard deviation of weekly returns over the six months prior to the estimation window of the respective dependent variable. *Cumulative return$_{t-1}$* is the cumulative stock return over the three months prior to the estimation window of the respective dependent variable. *Share turnover$_{t-1}$* is average number of shares divided by the number of shares outstanding over the three months prior to the estimation window of the respective dependent variable. The regressions also include three price-level dummy variables that indicate whether the median stock price over the three months prior to the estimation window of the respective dependent variable is below \$0.01, \$0.10 or \$1.00. The coefficient estimates of the price-level controls are not reported for brevity. All Panels report 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: Market Liquidity and Price Efficiency – Venue, SEC Filing Status and Manuals

Panel A: Proportion of zero return days

Independent variables	Dependent variable: Proportion of zero return days							
	All venues		NBB only		All venues		NBB only	
	Full sample	Prop. matched sample	Full sample	Prop. matched sample	Full sample	Prop. matched sample	Full sample	Prop. matched sample
Manual	-0.038***	-0.030***	-0.067***		-0.030***	-0.025***	-0.044***	
	(-11.42)	(-8.64)	(-11.77)		(-12.20)	(-8.53)	(-13.52)	
SEC	-0.024***		-0.038***	-0.024***	-0.032***		-0.033***	-0.028***
	(-4.47)		(-6.99)	(-4.18)	(-9.78)		(-10.65)	(-8.07)
BB	-0.122***	-0.149***			-0.109***	-0.114***		
	(-22.20)	(-28.82)			(-30.96)	(-28.73)		
SCM	-0.436***	-0.452***			-0.328***	-0.323***		
	(-57.00)	(-59.44)			(-55.09)	(-50.23)		
Exchange	-0.481***	-0.481***			-0.306***	-0.301***		
	(-69.98)	(-65.61)			(-55.05)	(-46.47)		
Log(Market value$_{t-1}$)	-0.064***	-0.081***	-0.047***	-0.057***	-0.051***	-0.058***	-0.036***	-0.043***
	(-60.68)	(-47.55)	(-39.84)	(-29.98)	(-55.78)	(-40.02)	(-31.24)	(-22.10)
Return volatility$_{t-1}$	-0.050***	-0.098***	-0.050***	-0.065***	-0.006**	-0.038***	-0.014***	-0.020***
	(-13.20)	(-12.34)	(-14.06)	(-10.14)	(-2.17)	(-6.50)	(-5.70)	(-4.08)
Price-level dummies	Yes	Yes	Yes	Yes				
Firm fixed effects					Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.56	0.49	0.28	0.23	0.77	0.76	0.66	0.70
# Firm months	741,044	381,317	326,286	115,727	741,044	381,317	326,286	115,727

Panel B: Share turnover

Independent variables	Dependent variable: Share turnover							
	All venues		NBB only		All venues		NBB only	
	Full sample	Prop. matched sample	Full sample	Prop. matched sample	Full sample	Prop. matched sample	Full sample	Prop. matched sample
Manual	0.011***	0.013***	0.037***		0.023***	0.016***	0.039***	
	(3.03)	(3.49)	(8.10)		(6.90)	(4.06)	(10.05)	
SEC	0.014***		0.014***	0.008*	0.021***		0.014***	0.010**
	(3.32)		(3.45)	(1.80)	(5.21)		(3.80)	(2.37)
BB	0.041***	0.055***			0.053***	0.058***		
	(9.63)	(13.96)			(12.16)	(12.96)		
SCM	0.181***	0.192***			0.188***	0.185***		
	(19.73)	(20.93)			(19.59)	(17.81)		
Exchange	0.322***	0.300***			0.230***	0.216***		
	(33.76)	(33.37)			(27.09)	(24.64)		
Log(Market value$_{t-1}$)	0.022***	0.030***	0.009***	0.010***	0.008***	0.010***	0.001	0.001
	(20.24)	(18.36)	(9.09)	(6.33)	(6.55)	(5.06)	(0.55)	(0.41)
Return volatility$_{t-1}$	0.058***	0.097***	0.038***	0.024***	0.038***	0.076***	0.027***	0.019***
	(16.62)	(13.83)	(11.93)	(4.58)	(12.20)	(11.06)	(9.81)	(3.49)
Price-level dummies	Yes	Yes	Yes	Yes				
Firm fixed effects					Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.12	0.12	0.02	0.02	0.36	0.39	0.31	0.39
# Firm months	732,648	377,523	323,049	114,577	732,648	377,523	323,049	114,577

Table 7 (continued)

Panel C: Autocorrelation

Independent variables	Dependent variable: Autocorrelation							
	All venues		NBB only		All venues		NBB only	
	Full sample	Prop. matched sample	Full sample	Prop. matched sample	Full sample	Prop. matched sample	Full sample	Prop. matched sample
Manual	0.002*	0.001	-0.007**		-0.002	-0.001	-0.013***	
	(1.75)	(0.52)	(-2.25)		(-1.32)	(-0.64)	(-3.02)	
SEC	-0.009***		-0.009***	-0.009***	-0.017***		-0.015***	-0.013***
	(-3.26)		(-3.16)	(-2.69)	(-6.12)		(-4.33)	(-3.00)
BB	-0.024***	-0.028***			-0.024***	-0.031***		
	(-9.69)	(-13.73)			(-9.37)	(-11.29)		
SCM	-0.064***	-0.067***			-0.052***	-0.060***		
	(-21.60)	(-23.65)			(-13.80)	(-14.18)		
Exchange	-0.067***	-0.069***			-0.043***	-0.051***		
	(-23.28)	(-25.57)			(-13.50)	(-14.19)		
Log(Market value$_{t-1}$)	-0.016***	-0.017***	-0.018***	-0.019***	-0.013***	-0.012***	-0.015***	-0.015***
	(-34.55)	(-27.81)	(-23.92)	(-17.32)	(-20.11)	(-13.63)	(-13.11)	(-7.42)
Return volatility$_{t-1}$	0.023***	0.011*	0.038***	0.040***	0.020***	0.016**	0.006	0.005
	(5.73)	(1.92)	(7.41)	(5.25)	(4.68)	(2.49)	(1.01)	(0.47)
Cumulative return$_{t-1}$	-0.001**	0.000	-0.005***	-0.005***	-0.003***	-0.002**	-0.005***	-0.004***
	(-2.08)	(0.07)	(-4.63)	(-3.49)	(-4.45)	(-2.19)	(-4.58)	(-2.61)
Share turnover$_{t-1}$	-0.044***	-0.045***	-0.059***	-0.069***	-0.025***	-0.023***	-0.028***	-0.027***
	(-33.97)	(-26.94)	(-23.59)	(-18.22)	(-17.97)	(-12.45)	(-9.41)	(-5.60)
Price-level dummies	Yes	Yes	Yes	Yes				
Firm fixed effects					Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.06	0.05	0.04	0.04	0.12	0.13	0.15	0.20
# Firm months	482,895	301,250	134,341	62,154	482,895	301,250	134,341	62,154

Panel D: Negative skewness

Independent variables	Dependent variable: Negative skewness							
	All venues		NBB only		All venues		NBB only	
	Full sample	Prop. matched sample	Full sample	Prop. matched sample	Full sample	Prop. matched sample	Full sample	Prop. matched sample
Manual	-0.017	0.038**	-0.058*		0.018	0.047**	-0.030	
	(-1.28)	(2.54)	(-1.77)		(1.01)	(2.23)	(-0.70)	
SEC	-0.186***		-0.158***	-0.117***	-0.309***		-0.281***	-0.233***
	(-6.14)		(-5.04)	(-3.35)	(-8.68)		(-6.52)	(-4.34)
BB	-0.497***	-0.483***			-0.585***	-0.596***		
	(-18.59)	(-22.00)			(-18.70)	(-20.14)		
SCM	-0.758***	-0.776***			-0.922***	-0.947***		
	(-22.83)	(-24.74)			(-21.26)	(-21.35)		
Exchange	-0.566***	-0.620***			-0.930***	-0.961***		
	(-17.76)	(-20.48)			(-23.41)	(-22.63)		

(continued)

Table 7 (continued)

Log(Market value$_{t-1}$)	0.040***	0.055***	0.031***	0.020*	0.225***	0.240***	0.283***	0.275***
	(8.10)	(7.52)	(4.64)	(1.67)	(29.39)	(21.41)	(22.44)	(11.91)
Return volatility$_{t-1}$	0.132***	0.396***	0.039	0.166**	0.002	0.159**	-0.064	0.048
	(4.22)	(6.94)	(1.10)	(2.57)	(0.07)	(2.33)	(-1.58)	(0.57)
Cumulative return$_{t-1}$	0.253***	0.174***	0.295***	0.225***	0.336***	0.296***	0.418***	0.417***
	(31.95)	(16.54)	(26.29)	(13.78)	(41.36)	(27.95)	(35.70)	(23.51)
Share turnover$_{t-1}$	-0.045***	-0.028	-0.125***	-0.078**	0.028*	0.060***	-0.049	-0.008
	(-3.20)	(-1.49)	(-4.86)	(-2.18)	(1.88)	(3.08)	(-1.61)	(-0.19)
Price-level dummies	Yes	Yes	Yes	Yes				
Firm fixed effects					Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.03	0.03	0.03	0.03	0.12	0.19	0.14	0.23
# Firm months	665,025	347,059	295,256	105,272	665,025	347,059	295,256	105,272

This table presents regression analyses relating proxies for market liquidity (Panels A and B) and price efficiency (Panels C and D) to indicators for trading venue, SEC filing status and publication in a securities manual. All regressions are estimated at the firm-month level and include month-year and either industry- or firm-fixed effects. The analyses are based on the NASDAQ venue history (period: January 2001 to October 2010) and include either observations from all venues or from the NBB only (Pink Quote and Grey Market). Within these categories, we estimate separate regressions based either on the full sample or on a propensity-matched sample. We match on the variable of interest (SEC filing or manual publication) using market value, return volatility and stock price, each lagged by six months as well as industry dummies, dummies for state of headquarters and year dummies. *SEC* is a dummy variable indicating firms that file 10Ks and 10Qs with SEC. 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 choose not to file with the SEC. *Manual* indicates firms that are published in either Mergent's Manual or the Standard & Poor's Corporation Records during the respective year. The other variables are described in Table 6. All Panels report 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: Market Liquidity and Price Efficiency – State Merit Reviews and Manuals

Panel A: Market liquidity measures

Independent variables	Dependent variable: Proportion of zero return days				Dependent variable: Share turnover			
Merit review	-0.015***	-0.012***			0.006**	0.004		
	(-4.60)	(-3.55)			(2.31)	(1.57)		
Merit review (with manual exemption)			-0.012***	-0.010**			0.002	0.001
			(-3.10)	(-2.56)			(0.81)	(0.43)
Merit review (w/o manual exemption)			-0.016***	-0.012***			0.008***	0.006**
			(-4.89)	(-3.69)			(2.87)	(2.05)
Manual	-0.043***	-0.044***			0.006*	0.006*		
	(-10.92)	(-11.16)			(1.65)	(1.81)		
Manual (with manual exemption)			-0.042***	-0.043***			0.006	0.007*
			(-8.65)	(-8.91)			(1.50)	(1.66)
Manual (w/o manual exemption)			-0.046***	-0.046***			0.005	0.005
			(-7.63)	(-7.70)			(0.94)	(1.00)
SEC	-0.026***	-0.025***	-0.026***	-0.025***	0.027***	0.027***	0.027***	0.027***
	(-4.59)	(-4.52)	(-4.60)	(-4.52)	(6.18)	(6.18)	(6.19)	(6.18)
BB	-0.115***	-0.116***	-0.115***	-0.116***	0.036***	0.037***	0.036***	0.037***
	(-20.08)	(-20.42)	(-20.09)	(-20.42)	(8.22)	(8.48)	(8.21)	(8.47)
Log(Market value$_{t-1}$)	-0.064***	-0.064***	-0.064***	-0.064***	0.015***	0.014***	0.015***	0.014***
	(-55.39)	(-55.12)	(-55.34)	(-55.09)	(14.80)	(14.37)	(14.71)	(14.31)
Return volatility$_{t-1}$	-0.052***	-0.047***	-0.052***	-0.047***	0.046***	0.044***	0.046***	0.044***
	(-12.81)	(-11.76)	(-12.80)	(-11.77)	(13.19)	(12.46)	(13.20)	(12.47)
SoInc ≠ SoHqt		-0.045***		-0.045***		0.029***		0.028***
		(-10.73)		(-10.60)		(8.89)		(8.73)
Price-level dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.39	0.39	0.39	0.39	0.04	0.04	0.04	0.04
# Firm months	560,534	556,575	560,534	556,575	554,929	550,980	554,929	550,980

Panel B: Price efficiency measures

Independent variables	Dependent variable: Autocorrelation				Dependent variable: Negative skewness			
Merit review	-0.002*	-0.001			-0.020	-0.026*		
	(-1.70)	(-0.73)			(-1.43)	(-1.80)		
Merit review (with manual exemption)			-0.002	-0.001			-0.012	-0.016
			(-1.39)	(-0.83)			(-0.69)	(-0.94)
Merit review (w/o manual exemption)			-0.002	-0.001			-0.024	-0.030**
			(-1.51)	(-0.44)			(-1.58)	(-1.98)
Manual	0.001	0.001			-0.017	-0.018		
	(0.73)	(0.52)			(-1.10)	(-1.12)		
Manual (with manual exemption)			0.002	0.002			-0.009	-0.008
			(1.07)	(0.88)			(-0.46)	(-0.40)
Manual (w/o manual exemption)			-0.000	-0.001			-0.031	-0.034
			(-0.16)	(-0.26)			(-1.31)	(-1.42)
SEC	-0.008***	-0.008***	-0.008***	-0.008***	-0.163***	-0.167***	-0.164***	-0.167***
	(-2.80)	(-2.71)	(-2.81)	(-2.71)	(-5.24)	(-5.34)	(-5.24)	(-5.35)
BB	-0.023***	-0.023***	-0.023***	-0.023***	-0.489***	-0.486***	-0.489***	-0.486***
	(-8.93)	(-9.15)	(-8.93)	(-9.15)	(-17.77)	(-17.64)	(-17.77)	(-17.63)

(continued)

Table 8 (continued)

Log(Market value$_{t-1}$)	-0.018***	-0.017***	-0.018***	-0.017***	0.028***	0.027***	0.028***	0.027***
	(-32.53)	(-31.69)	(-32.50)	(-31.69)	(5.14)	(4.88)	(5.18)	(4.92)
Return volatility$_{t-1}$	0.021***	0.025***	0.021***	0.025***	0.108***	0.098***	0.108***	0.098***
	(4.94)	(5.72)	(4.93)	(5.72)	(3.25)	(2.92)	(3.25)	(2.91)
Cumulative return$_{t-1}$	-0.002***	-0.002***	-0.002***	-0.002***	0.246***	0.248***	0.246***	0.248***
	(-2.62)	(-2.93)	(-2.62)	(-2.92)	(28.30)	(28.44)	(28.30)	(28.44)
Share turnover$_{t-1}$	-0.061***	-0.060***	-0.061***	-0.060***	-0.123***	-0.131***	-0.122***	-0.130***
	(-34.14)	(-33.60)	(-34.11)	(-33.60)	(-7.40)	(-7.90)	(-7.37)	(-7.87)
SoInc ≠ SoHqt		-0.015***		-0.015***		0.080***		0.083***
		(-8.95)		(-8.93)		(4.19)		(4.30)
Price-level dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03
# Firm months	340,004	338,194	340,004	338,194	505,874	502,418	505,874	502,418

This table presents regression analyses relating proxies for market liquidity (Panel A) and price efficiency (Panel B) to the strictness of Blue Sky laws (merit reviews) at the state level. We attach Blue Sky laws based on firms' state of headquarters as most states require home state registration. All regressions are estimated at the firm-month level and include month-year 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 measure for the strictness of the state's merit review as described in section 3. In some specifications, we distinguish between states that offer a manual exemption and those that do not (*with* or *w/o manual exemption*). Thus, *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 ≠ SoHqt* equals one for firms that are incorporated outside the state of their headquarters, and zero otherwise. The other variables are described in Tables 6 and 7, respectively. All panels report 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 9: Market Liquidity and Price Efficiency – Pink Sheets Tiers and Caveat Emptor

Independent variables	Market liquidity measures				Price efficiency measures			
	Dependent Variable: Proportion of zero return days		Dependent Variable: Share turnover		Dependent Variable: Autocorrelation		Dependent Variable: Negative skewness	
Caveat Emptor	0.024**	0.023*	0.006	0.006	-0.014	-0.013	0.305*	0.309*
	(1.99)	(1.92)	(0.37)	(0.38)	(-0.86)	(-0.84)	(1.71)	(1.72)
Pink No Info	-0.079***	-0.078***	0.069***	0.069***	-0.049**	-0.049**	-0.678***	-0.679***
	(-6.19)	(-6.10)	(4.01)	(4.00)	(-2.19)	(-2.19)	(-3.28)	(-3.30)
Pink Limited Info	-0.131***	-0.129***	0.115***	0.114***	-0.067***	-0.068***	-1.086***	-1.092***
	(-9.63)	(-9.50)	(5.88)	(5.87)	(-2.95)	(-2.95)	(-4.91)	(-4.95)
Pink Current Info	-0.182***	-0.203***	0.139***	0.145***	-0.085***	-0.081***	-1.250***	-1.176***
	(-11.83)	(-11.11)	(6.26)	(5.47)	(-3.57)	(-3.25)	(-5.16)	(-4.55)
Pink Current Info x SEC		0.041***		-0.011		-0.008		-0.184
		(3.15)		(-0.61)		(-0.62)		(-0.86)
Manual	-0.011**	-0.012**	0.014	0.014	0.009	0.009	-0.081	-0.073
	(-2.03)	(-2.36)	(1.56)	(1.62)	(1.04)	(1.08)	(-0.96)	(-0.87)
Log(Market value$_{t-1}$)	-0.039***	-0.039***	-0.013***	-0.013***	-0.010***	-0.010***	0.456***	0.456***
	(-18.06)	(-18.07)	(-3.34)	(-3.35)	(-4.36)	(-4.39)	(13.96)	(13.94)
Return volatility$_{t-1}$	-0.014**	-0.014**	0.046***	0.046***	-0.011	-0.011	0.424***	0.423***
	(-2.21)	(-2.21)	(5.00)	(5.00)	(-0.91)	(-0.91)	(3.07)	(3.06)
Cumulative return$_{t-1}$					-0.004*	-0.004*	0.480***	0.480***
					(-1.88)	(-1.89)	(21.93)	(21.95)
Share turnover$_{t-1}$					0.001	0.001	0.110**	0.109**
					(0.14)	(0.13)	(2.27)	(2.25)
Price-level dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.71	0.71	0.40	0.40	0.20	0.20	0.24	0.24
# Firm months	71,114	71,114	69,863	69,863	38,400	38,400	52,973	52,973

This table presents regression analyses relating proxies for market liquidity and price efficiency to indicators for the Pink Sheets information tiers and the Caveat Emptor label. All regressions are estimated at the firm-month level and include month-year and firm-fixed effects. The analyses are based on the PS tier history (period: October 2007 to October 2010) and includes only observations from the NBB (Pink Sheets and Grey Market). *Caveat Emptor* is a dummy variable indicating firms that are flagged as having a public interest concern by the OTC Markets Group. *Pink No Info*, *Pink Limited Info* and *Pink Current Info* are indicator variables for firms in the respective Pink Sheet information tier. These information tiers were introduced by the OTC Markets Group in 2007. Grey Market firms are the omitted category. The other variables are described in Tables 6 and 7, respectively. All panels report 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 10: Market Liquidity and Price Efficiency – Regime Changes in the Pink Sheets

Panel A: Market liquidity measures

Independent variables	Dependent variable: Proportion of zero return days				Dependent variable: Share turnover			
	NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010		NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010	
BB	-0.171***	-0.143***	-0.130***	-0.102***	0.086***	0.083***	0.077***	0.059***
	(-28.40)	(-34.12)	(-15.99)	(-17.82)	(17.67)	(17.29)	(9.43)	(8.35)
BB x Regime index	0.151***	0.085***	0.142***	0.052***	-0.139***	-0.087***	-0.145***	-0.055***
	(19.11)	(12.18)	(11.88)	(5.67)	(-20.39)	(-12.19)	(-13.09)	(-5.71)
SEC	-0.025***	-0.029***	-0.032***	-0.026***	0.027***	0.023***	0.046***	0.026***
	(-4.75)	(-8.93)	(-5.16)	(-6.69)	(6.46)	(6.15)	(7.64)	(5.13)
Manual	-0.049***	-0.033***	-0.064***	-0.034***	0.009***	0.018***	0.020***	0.017***
	(-12.61)	(-12.20)	(-13.57)	(-10.30)	(2.68)	(5.93)	(4.67)	(4.03)
Log(Market value$_{t-1}$)	-0.063***	-0.051***	-0.080***	-0.057***	0.013***	0.002*	0.019***	-0.000
	(-56.86)	(-52.39)	(-53.15)	(-39.91)	(14.49)	(1.81)	(12.87)	(-0.22)
Return volatility$_{t-1}$	-0.047***	-0.003	-0.073***	-0.022***	0.047***	0.030***	0.067***	0.047***
	(-12.60)	(-1.20)	(-11.03)	(-4.55)	(14.65)	(10.60)	(11.47)	(8.62)
Price-level dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes		Yes		Yes
Industry fixed effects	Yes		Yes		Yes		Yes	
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.39	0.69	0.37	0.70	0.04	0.29	0.05	0.32
# Firm months	629,765	629,765	308,263	308,263	623,584	623,584	304,889	304,889

Panel B: Price efficiency measures

Independent variables	Dependent variable: Autocorrelation				Dependent variable: Negative skewness			
	NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010		NASDAQ venue history: Jan 2001 - Oct 2010		PS venue history: Feb 2003 - Oct 2010	
BB	-0.044***	-0.047***	-0.033***	-0.025***	-0.648***	-0.680***	-0.502***	-0.459***
	(-14.33)	(-13.35)	(-7.83)	(-5.07)	(-19.35)	(-16.38)	(-10.77)	(-8.08)
BB x Regime index	0.049***	0.047***	0.040***	0.018**	0.620***	0.305***	0.388***	0.005
	(10.09)	(7.94)	(5.86)	(2.18)	(11.84)	(4.85)	(5.28)	(0.05)
SEC	-0.006**	-0.014***	-0.012***	-0.016***	-0.214***	-0.356***	-0.243***	-0.380***
	(-2.27)	(-4.50)	(-3.80)	(-4.29)	(-6.94)	(-9.16)	(-6.32)	(-8.17)
Manual	0.001	-0.004**	-0.002	-0.005**	-0.063***	-0.006	-0.068***	-0.033
	(0.82)	(-2.01)	(-1.38)	(-2.22)	(-4.11)	(-0.30)	(-3.78)	(-1.20)
Log(Market value$_{t-1}$)	-0.018***	-0.014***	-0.019***	-0.013***	0.027***	0.225***	0.028***	0.277***
	(-34.25)	(-19.43)	(-27.87)	(-13.25)	(5.22)	(26.95)	(3.53)	(21.47)
Return volatility$_{t-1}$	0.019***	0.015***	0.014**	0.004	0.150***	0.001	0.162***	0.120*
	(4.90)	(3.45)	(2.48)	(0.73)	(4.73)	(0.04)	(2.85)	(1.77)
Cumulative return$_{t-1}$	-0.002***	-0.003***	-0.001	-0.003***	0.259***	0.349***	0.255***	0.342***
	(-3.05)	(-4.46)	(-1.07)	(-2.59)	(31.20)	(40.64)	(24.13)	(30.97)
Share turnover$_{t-1}$	-0.059***	-0.032***	-0.057***	-0.027***	-0.193***	-0.055***	-0.184***	-0.031
	(-35.05)	(-18.08)	(-26.00)	(-11.97)	(-12.85)	(-3.15)	(-9.95)	(-1.45)
Price-level dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects		Yes		Yes		Yes		Yes
Industry fixed effects	Yes		Yes		Yes		Yes	
Month-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.04	0.11	0.04	0.12	0.03	0.12	0.03	0.14
# Firm months	375,070	375,070	214,780	214,780	558,042	558,042	284,682	284,682

Table 10 (continued)

This table presents regression analyses relating proxies for market liquidity (Panel A) and price efficiency (Panel B) to regulatory changes in the Pink Sheets markets. The analyses are either 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) or on a subsample of BB and Pink Sheets firm-month observations from the PS venue history (period: February 2003 to October 2010). All regressions are estimated at the firm-month level and include month-year and either industry- or firm-fixed effects. *Regime index* is an ordinal variable that increases with major reforms in the regulatory regime of the Pink Sheets. It takes the value of 0 (from the start of the sample period until May 2003), 0.25 (from Jun 2003 to Jul 2007), 0.5 (from Aug 2007 to May 2009), 0.75 (from Jun 2009 to Mar 2010) and 1 (from Apr 2010 to the end of the sample period). The other variables are described in Tables 6 and 7, respectively. All panels report 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 11: Return Analysis by Information Regime

Portfolio weighting	NBB				BB		SCM only	
	SEC no		SEC yes		SEC required		SEC required	
	Manual no	Manual yes	Manual no	Manual yes	Manual no	Manual yes	Manual no	Manual yes
Equal	-0.048***	-0.049***	-0.049***	-0.059***	-0.052***	-0.050***	-0.008	-0.004
	(-10.15)	(-6.76)	(-7.73)	(-8.67)	(-11.73)	(-8.94)	(-0.76)	(-1.06)
Value	-0.049***	-0.015**	-0.042***	-0.033***	-0.056***	-0.041***	-0.018	-0.009***
	(-8.59)	(-2.41)	(-4.75)	(-4.20)	(-13.08)	(-6.04)	(-1.58)	(-2.64)

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 the market premium, SMB, HML, momentum and the Pastor-Stambaugh (2003) liquidity factors. The liquidity factor is available at Lubos Pastor's website and the remaining factors come from Kenneth French's website. We include three lags of each factor in addition to the contemporaneous value to account for thin trading. Firm months during which the information regime changes (e.g. due to a venue switch and/or (de-)registering with the SEC) are excluded from the regressions. All panels report 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.