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The trouble with small tick sizes

Larger tick sizes will bring back capital formation, jobs and investor confidence

Capital Markets Series



The authors gratefully acknowledge the contributions of Adele Hogan to the legal and regulatory aspects of this report, including the enclosed draft legislation and phase-in implementation schedules that we are providing to inform the discussion.

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Executive summary

The Jumpstart Our Business Startups (JOBS) Act, signed into law on April 5, 2012, delivered two of the three legs of the stool required to revive the U.S. IPO market: 1) a framework to lower costs for small companies accessing the public markets, and 2) a framework to improve company communication with investors in the public and private markets. The authors argue that a framework to realign economic incentives in the public markets, primarily through a higher tick size (the minimum increment in which a stock or other security can trade) pricing regimen, is the essential third leg that is currently missing from the stool. The authors conclude that higher tick sizes will:

- lead to investment in the ecosystem (research, stock sales, investment banking and capital commitment to provide institutional liquidity) required to successfully take companies public and support them in the aftermarket;
- favor long-term investors and stock pickers over short-term traders; and
- increase investor confidence by reducing the number of price points at which stocks are traded and by limiting computer trading behaviors.

The authors contend that the current penny and sub-penny tick size regimen, especially as applied to less-visible and less-

liquid stocks — the natural state of most public companies and nearly all small public companies — is at the root of the systemic decline in the U.S. IPO market and that it contributes to trading behaviors that undermine investor confidence. While the current system may be tolerable (trading behaviors aside) for large-cap and mid-cap stocks with adequate natural liquidity and visibility, it is detrimental to issuers and investors in the more than 80% of listed companies that are small-cap and smaller and do not enjoy natural liquidity and visibility. They offer quantitative and qualitative evidence that the majority of harm to the U.S. IPO market was caused in 1997 and 1998 by the implementation of the Order Handling Rules and Regulation Alternative Trading Systems, which caused the bankable spread¹ available to small investment banks to drop from 25 cents per share to the minimum tick sizes of 6.25 cents (for NASDAQ stocks priced greater than \$10) and 3.125 cents (for NASDAQ stocks priced under \$10). This shift, from a quote-driven to an electronic-order-driven market, set the conditions under which decimalization would be implemented in 2001. However, decimalization, which further eroded the bankable spread from 6.25 cents and 3.125 cents to 1 cent, was a comparatively minor change — essentially a *coup de grâce* that removed any remaining economic incentives required to sustain a vibrant market and help support the U.S. economy.

The most important provision of the Jumpstart Our Business Startups (JOBS) Act, signed into law on April 5, 2012, is a little-known section (Title I, Section 106(b)) titled “Other Matters — Tick Size.” In it, Congress requires the SEC to conduct a study on the “transition to trading and quoting securities in one penny increments, also known as decimalization... [and] the impact that decimalization has had on the number of initial public offerings since its implementation relative to the period before its implementation.”

In our view, decimalization — a euphemism for the collapse in trading spreads, tick sizes and commissions — decimated the U.S. IPO market when it began in earnest with the 1998 implementation of Regulation ATS (alternative trading systems).

Adding back adequate economic incentives (through higher tick sizes, which may be the simplest way to accomplish this) to make the aftermarket support of small public companies once again profitable is likely the best way to achieve Congress's intent to bring back the small IPO and associated job growth.

¹ This is a notion that the authors use to describe how spreads are seen from the vantage point of market makers. It is the portion of a spread that market makers can reasonably rely upon to compensate them for their investment in capital, research and sales support. In a quote-driven market (pre-1998), bankable spreads were largely equivalent to quoted spreads, while in the electronic-order-driven market (post-1998), bankable spreads fell to the minimum tick size.

The authors recommend two alternative solutions — encompassed in what we call **The Jobs Act, Part 2** — to customize tick sizes² and create needed economic incentives to rebuild the ecosystem to support capital formation. Such solutions, which can be used individually or in combination, should be implemented via an SEC pilot program to provide valuable information before fully phasing in the solutions across the entire market.³ Both solutions rely on market forces to select tick sizes, as opposed to the current SEC-mandated system. The two recommended alternative solutions (which may be used in combination⁴) are as follows.

1. **Issuer choice of tick size**, where issuers of all sizes, but small-cap companies in particular, are given the authority to choose their own tick size within a range that is capped at a maximum of some percentage — say, 5% — of their share price.

An issuer’s board of directors would choose its tick size by consulting with institutional investors, investment banks and stock exchanges in order to arrive at an optimal increment for its shares that would address both the needs of the ecosystem and the liquidity in its shares.

Pros	Cons
Empowers issuers.	
Enables mass customization of micromarkets. Eliminates the one-size-fits-all penny and sub-penny market structure that many believe is undermining capital formation and job creation.	Increases complexity, which is why some prefer to limit the tick size options to simple increments of 1 cent, 5 cents, 10 cents, 20 cents, 50 cents and even \$1 increments on high-priced stocks.
Educates management and boards by compelling them to engage in a discussion with investors, stock exchanges, investment banks and other advisers on how choice of tick size may impact equity research coverage, capital commitment, liquidity and investor interest.	Issuers will have to invest time in understanding market structure, but this understanding should pay dividends by making issuers better equipped to interact with investors and investment banks.
Creates a wide variety of data for analysis that will paint an unprecedented picture of how tick sizes impact market quality (e.g., volume, liquidity, volatility, research coverage).	
Will curtail speculative and high-frequency trading by adding “friction” (cost) to trading, thereby favoring fundamentally oriented, long-term investors. Will increase the incentive for stockbrokers to market shares to investors.	Anytime incentives are increased to market stocks to investors, there is potential for increases in sales practice abuses. This will require increased enforcement on the part of the SEC and FINRA.
Shifts “aftermarket support” back to Wall Street and may allow management to focus more time and energy on running the business.	

² Liquidity rebates, payment for order flow, executions within tick increments through dark pools and other mechanisms that effectively enable trading within established tick sizes should be eliminated to create tick size “integrity.” Everyone in the market should obtain the same tick economics which will enhance investor confidence through a sense of fairness and transparency. Tick size integrity will also encourage competition on the basis of innovation and value creation — not simply trade economics to the dealer at the expense of investor best interests. The result will be to improve “best execution.”

³ The SEC has traditionally used pilot programs as a test and phase-in implementation strategy.

⁴ In the instance where the “issuer choice” alternative is used, for issuers that have not affirmatively made a choice in tick size, there might be a default option. That default option could be fulfilled by “algorithmic customization” of the issuer’s tick size.

2. Algorithmic customization of tick size, where the SEC could automate the “mass customization” of tick sizes via a simple algorithm that establishes increments at one-half of the average quoted spread of a stock over some defined period of time, e.g., trailing 12 months.⁵

Stock exchanges increasingly acknowledge that today’s market structure is effective only for a small minority of innately liquid, mostly large-cap stocks, and that higher priced and less-liquid stocks could benefit from higher-tick sizes, while lower-priced and extremely liquid stocks could benefit from smaller tick sizes. The New York Stock Exchange (NYSE), NASDAQ and BATS have jointly petitioned the SEC to request smaller tick sizes in very liquid, low-priced companies.⁶ Market participants have suggested that the logical extension of this request would be allowing larger tick sizes for illiquid and/or high-priced stocks.

Pros	Cons
Simple, in that it requires no input from issuers.	Requires an optimal algorithm. ⁷
Enables mass customization of micromarkets. Eliminates one-size-fits-all penny and sub-penny market structure that many believe is undermining capital formation and job creation.	Increases complexity, which is why some prefer to limit the tick size options to simple increments of 1 cent, 5 cents, 10 cents, 20 cents, 50 cents and even \$1 increments on high-priced stocks.
Requires no investment of time by management or management boards of directors in determining tick size.	No opportunity to educate management and boards by requiring them to engage in a discussion with investors, stock exchanges, investment banks and other advisers on how choice of tick size may impact equity research coverage, capital commitment, liquidity and investor interest.
Creates a variety of data for analysis that will paint an unprecedented picture of how tick sizes impact market quality (e.g., volume, liquidity, volatility, research coverage).	
Will curtail speculative and high-frequency trading by adding “friction” (cost) to trading of small-cap stocks, thereby favoring fundamentally oriented, long-term investors.	May exacerbate high-frequency trading in already liquid stocks (mostly S&P 500-type stocks) where the algorithm dictates sub-penny quotes (i.e., even smaller tick sizes than currently occur).
Shifts “aftermarket support” back to Wall Street and may allow management to focus more time and energy on running the business.	

⁵ For example, a stock that trades with a quoted spread of 20 cents might have a tick size of 10 cents (two increments within the natural spread). For a stock whose quoted spread is 1 cent per share, the tick size might be one-half of 1 cent (two sub-penny increments). The division in two of natural spreads is based on history. In the early 1990s, when quote spreads were generally 25 cents per share, most stocks traded in tick sizes of 12.5 cents. There were two ticks within the quoted spread, and capital formation for small businesses thrived. Academics have generally reported that small-cap stocks have not generally experienced a decrease in spreads, so a two-tick increment may best simulate the market-making incentives of the early 1990s, when small company capital formation thrived. However, further study may be needed to determine the optimal number of ticks. Trading-oriented entities should argue for smaller tick sizes (more ticks) and investment-oriented entities should argue for larger tick sizes (fewer ticks).

⁶ www.sec.gov/spotlight/reg/nms/jointnms/exemptionrequest043010.pdf.

⁷ Most 25-cent spread stocks traded in 12.5-cent tick sizes before 1998. The sub-\$50 million IPO eroded with the move to 6.25 cent tick sizes. As a result, we believe that limiting the number of ticks per quoted spread increment (e.g., to no more than two, and possibly only one), may be required to create an adequate economic incentive to materially improve capital commitment, research, and sales coverage for many issuers. Therefore, the algorithm used might be as simple as this: [(average quoted spread over trailing 12 months) divided by 2 = tick size] or simply [(average quoted spread over trailing 12 months) = tick size].

Pilot program: Regarding trial and implementation, the authors suggest a pilot program, which the SEC should establish to examine larger tick sizes in a significant (hundreds) and representative (share price, volume, market value, etc.) sample of stocks. It must be acknowledged that while a pilot program would generate valuable data on the impact on short-term liquidity in these stocks, it will not enable the SEC to gauge the magnitude of commitments that Wall Street might make if it were certain that the size and scope of tick size increases would be made permanent. For example, Wall Street cannot be expected to hire permanent equity research analysts, institutional salespeople or sales traders (capital committers) in response to merely a pilot program. If this proposal is implemented and eventually expanded to the entire marketplace, the SEC may want to examine the magnitude of new investments in research, sales, trading and capital committed after a two- or three-year period. The authors believe that these commitments would be significant.

Finally, the authors also recommend that there be an associated “Issuer Bill of Rights”:

An Issuer (Job Creators) Bill of Rights would call for public companies to have:

1. equal standing to the trade execution community at the SEC on market structure matters;
2. representation in the form of a standing issuer advisory council to the SEC that comprises issuers and issuer advocates;
3. transparency, timeliness and completeness of ownership data,⁸ because issuers deserve real-time trading and ownership data of all long and short activity;
4. choice in market structure that is not “one-size-fits-all”; and
5. market structures that encourage fundamental investment strategies over trading strategies.

The recommended solutions, which the authors call **The JOBS Act, Part 2**, would build upon the JOBS Act. They would give issuers and their advocates a voice in this debate and provide the essential fuel through economic incentives that our capital markets and economy need. They would favor long-term, fundamentally oriented investors — the foundation without which the stock markets would cease to function — over short-term traders and would help to restore confidence in our stock markets.

⁸ Large investor positions are currently disclosed to the market on a delayed basis. These data do not disclose short positions and do not help issuers understand in near real-time (days) which investors have been transacting in their stock. The SEC should require the timely release of all issuer ownership data to the issuer, subject to insider trading restrictions, so that issuer managements can make more effective use of their time.

Tribble troubles (penny tick sizes)

“The financial system has been wounded by a flood of so-called innovations that merely promote hyper-rapid trading. ...Individual investors are being shortchanged.”

John C. Bogle, founder of VANGUARD
“A Mutual Fund Master, Too Worried to Rest”
Jeff Sommer
The New York Times
August 11, 2012

Imagine a stock market in which the cost to buy and sell stocks is “free.” While it might appear to be shiny at first, the reality is that such a market would not survive. There would be no money to pay for research, so research would disappear. There would be no money to pay for salespeople, so all marketing of public company shares would cease. There would be no money to support liquidity, so institutional investors would abandon small companies — which are innately illiquid — in favor of large companies. There would be no money to pay for stock exchanges and alternative trading systems (ATSs). And there would be insufficient standing infrastructure to take companies public, so investor returns would evaporate.

The stock market would collapse.

The reality today, however, is not far from the above fiction. The U.S. stock market, especially for smaller capitalization companies, has been in a state of progressive erosion that dates back to Regulation ATS and the collapse of tick sizes⁹ that culminated with decimalization in 2001 and the implementation of Regulation NMS (national market system) beginning in 2006. The stock market is in its 15th year of a slow, relentless collapse, where companies delist at a rate three times that at which new companies go public.

Today’s stock market is nearly transaction cost-free and overrun by trading schemes that displace investors: Tick sizes are down to a penny or less, and retail commissions are down to \$5 a trade. High-quality sell-side research has eroded, as talented analysts have fled Wall Street for hedge funds in what a former head of the Securities Industry and Financial Markets Association’s (SIFMA) research committee aptly called the “brain drain.” The median market value of companies covered by equity research analysts has steadily increased. There are far fewer investment banks acting as bookrunners on IPOs than in the 1990s. Middle-market institutional sales desks have all been closed.

⁹ Tick size is the minimum increment in which a stock or other security can trade.

“The Trouble with Tribbles,” (or tick sizes in stock markets) is a celebrated *Star Trek* episode that introduced viewers to Tribbles. These tiny, asexual, furry animals are initially soothing and highly sought after — like small tick sizes are to consumer advocates and many micromarket economists — until they multiply. The prolific breeding of the Tribbles (tick sizes) rapidly overwhelms the Starship Enterprise (the U.S. stock market), consuming all of the crew’s food (revenue to support small brokerage firms) until, at the brink of suffocation (market collapse), the Tribbles (tick sizes) begin to die off.

The trouble with U.S. stock markets is that our Tribbles have not died off and, until recently, have been on a more than decadelong breeding and feeding frenzy. Congress and the SEC must step in to reverse the damage by driving increases to tick sizes, especially in sub-\$2 billion market value stocks.

Tick sizes have multiplied from four ticks to the dollar (one-fourth of a point in the early 1990s) to eight ticks to the dollar (one-eighth of a point) to 32 ticks to the dollar (effected by Regulation ATS) to 100 ticks to the dollar (effected by decimalization) and finally to as many as 1,000 ticks to the dollar (effected by Regulation NMS) in dark pools and more. The United States suffocated support for small-cap public companies

Many have been misled by the artful misuse of “quote” and “tick” jargon.

- **Tick size:** The minimum increment in which a stock or other security can trade. This number is largely determined by regulators (permission) and technology (capability). In the early 1990s, minimum tick sizes were largely in 12.5 cent increments. Bankable spreads (see definition below), however, were frequently 25 cents. Tick sizes were decreased to as little as 3.125 cents, after the implementation of the Order Handling Rules and Regulation ATS in 1997 and 1998. Tick sizes became a penny with the advent of decimalization in 2001.
- **Effective tick size:** In a quote-driven market that either does not permit or is not dominated by electronic execution and electronic posting of limit orders, the effective tick size can be higher than the “stated” tick size. This was the case in the NASDAQ Stock Market in the early 1990s, and it led to a bankable and quoted spread (see definitions below) that was consistently higher than the stated tick size, leading to a higher effective tick size. The effective tick size in today’s markets is even less than the quoted tick size, as dark pools have allowed sub-penny trading and rebates within the tick.
- **Quoted spread:** The difference between the best posted or advertised offer to buy a security and the best posted or advertised offer to sell a security. Referred to as the “bid-ask spread,” it is generally agreed that quoted spreads have declined since the 1990s for all but the smaller-capitalization stocks.
- **Effective spread:** Measured as twice the difference between the midpoint of the bid-ask spread and the price paid (or received) by investors. Some claim that a lower effective spread necessarily indicates higher liquidity. It does not. There are other dimensions to liquidity, including 1) the dollar value of the security traded, 2) the time it takes to complete the trade, and 3) the slippage in price (if the midpoint of the spread moves, it undermines most measures of liquidity). A higher effective spread that can accommodate greater volume in a shorter period of time is more “liquid” than a lower effective spread that can accommodate less volume over a long period of time. Generally speaking, highly liquid stocks are made more liquid by lower tick sizes, resulting in lower effective spreads. However, less-liquid stocks may be made more liquid by higher tick sizes and higher “bankable spreads,” resulting in higher effective spreads.
- **Bankable spread:** A notion that the authors use to describe how spreads are seen from the vantage point of market makers. It is the portion of a spread that market makers can reasonably rely upon to compensate themselves for their investment in capital, research and sales support. In today’s electronic-order driven market, as a rule of thumb, the bankable spread is generally equivalent to the tick size. This was not always the case. In the quote-driven market that existed prior to 1998, the bankable spread was equivalent to the quoted spread and was therefore at multiples that were larger than the tick size. Bankable spreads declined dramatically in 1998 with the implementation of Regulation ATS, undermining the role of market makers (and liquidity, especially for naturally less-liquid stocks). Decimalization and Regulation NMS added to the decline in bankable spreads.

by depriving small Wall Street firms of a revenue model that supports capital formation by investing in fundamental research, salesmanship and capital support.

Cutting the number of ticks to the dollar (i.e., increasing tick sizes) in sub-\$2 billion market value stocks will bring life back to capital formation and with it, innovation, job growth and U.S. competitiveness. Cutting the number of ticks to the dollar in large-cap stocks would limit speculation, high-frequency trading and so-called casino capitalism, by adding economic friction back into the markets. In the case of large-cap, high-priced stocks, most stock exchanges believe that an increase in tick size would increase liquidity, while smaller tick sizes would increase liquidity still further for lower-priced, large-cap stocks.

Prior to 1998, our stock market structure provided a successful framework within which many small IPOs (sub-\$50 million in proceeds) accessed U.S. capital markets. From 1991 to 1997, there were 2,990 small IPOs, representing nearly 80% of all U.S. IPOs, as shown in Exhibit 1 (see page 8). Although tick sizes during this time frame were largely in 12.5-cent increments, bankable spreads were largely in 25-cent increments. For example, in 1991, NASDAQ stocks priced at \$10 or more traded with a tick size, or “floor,” of 12.5 cents, while stocks priced below \$10 traded with a tick size floor of 3.125 cents. Their bankable spreads, however, still were frequently 25 cents.

“That silent whir that you hear on the trading floors of Goldman Sachs, Morgan Stanley and Credit Suisse is the post-apocalyptic sound of an oxygen-deprived, computer-dominated trading floor that has been reengineered to respond to an infestation of tiny ticks.”

David Weild
Grant Thornton LLP
and former vice chairman of NASDAQ

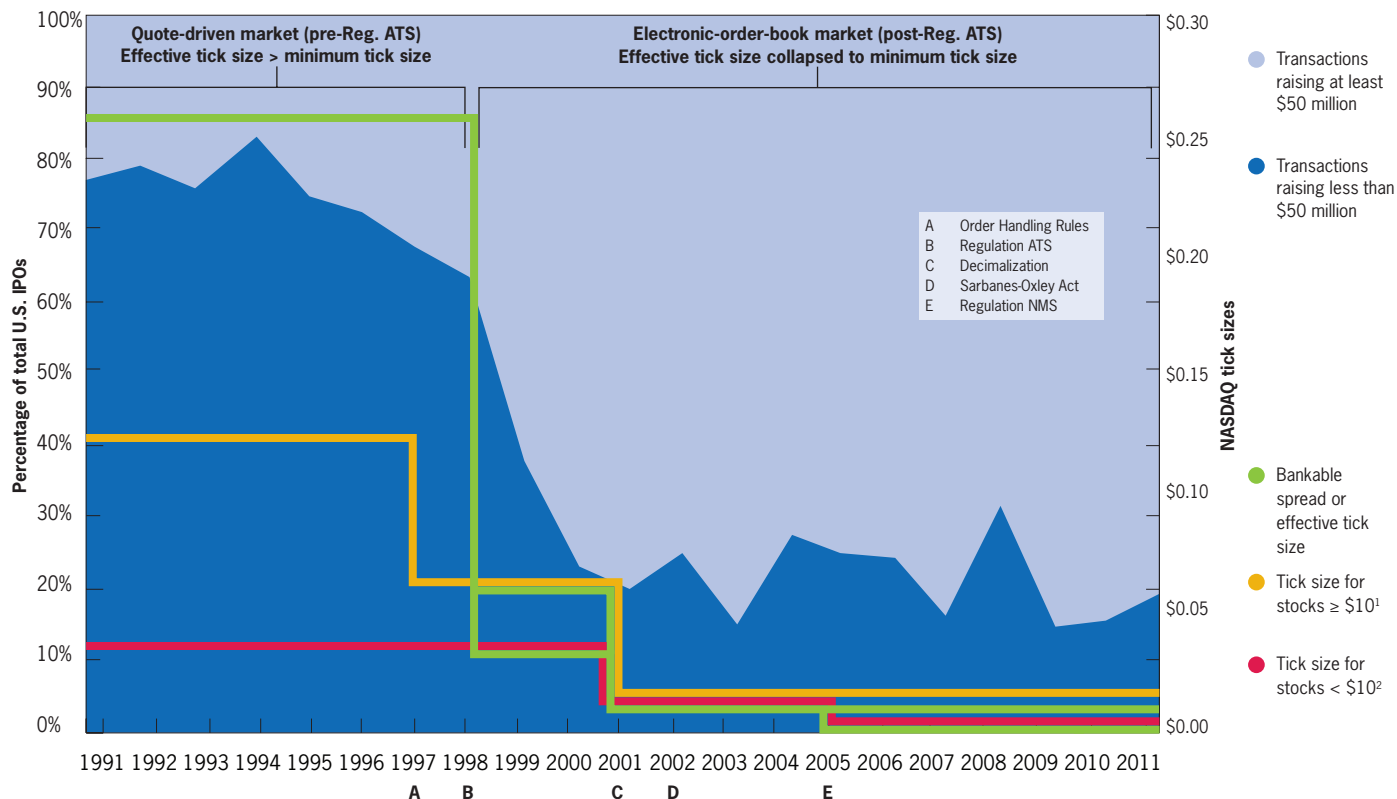
Market structure characteristics

1995	2012
Large-cap subsidized small-cap	No subsidies, small-cap fend for itself
Retail markets stocks	Retail manages portfolios
Broad institutional sales coverage	Narrow institutional sales coverage
Profitable aftermarket (for Wall Street)	Unprofitable aftermarket (for Wall Street)
Information additive research	Information mining (indexing, derivatives)
Fundamental investing	Technical and index investing
Uncorrelated industries	Increasingly correlated industries
Quoted	Electronic order driven
Large tick sizes	Small tick sizes

Sources: Grant Thornton LLP, Capital Markets Advisory Partners LLC.

Exhibit 1: The "one-two punch" of small tick sizes and the shift to electronic-order-book markets precipitated a secular decline in the U.S. stock markets

Tick size changes on the NASDAQ Stock Market overlaid on the drop in the number of small IPOs



Sources: Grant Thornton LLP, Capital Markets Advisory Partners LLC and Dealogic.
 Includes corporate IPOs as of Dec. 31, 2011, excluding funds, REITs, SPACs and LPs.
¹1991: \$0.125 for NASDAQ stocks ≥ \$10; 1997: \$0.0625 for NASDAQ stocks ≥ \$10.
²1991: \$0.03125 for NASDAQ stocks < \$10.

Compare this to the period beginning in 1998, when bankable spreads and tick sizes converged in the wake of new Order Handling Rules and Regulation ATS. The rapid proliferation of electronically posted orders from electronic communication networks (ECNs), crossing networks and other

ATs inexorably drove down tick sizes and bankable spreads to only 1 cent per share — a level that was grossly insufficient to sustain small company capital formation. The aftermarket support model that had worked so well for so long had collapsed, and with it, inevitably, so did small company IPOs.

Starting in 1997, a series of SEC-implemented regulations altered the economic infrastructure on which small companies relied:

- **Order Handling Rules (1997)** required dealers to provide investors with their most competitive quotes. It laid the groundwork for greater competition between dealers, which allowed tick sizes and liquidity to narrow, with new regulations enacted in 1998 and 2001.
- **Regulation ATS (alternative trading systems) (1998)** allowed approved electronic networks to link their securities and orders with registered exchanges. It exposed traditional trading venues like NASDAQ to fierce competition by driving down the volume of orders and reducing tick sizes to 3.125 cents.
- **Decimalization (2001)** required stocks to be quoted in decimals instead of fractions. Decimal quoting allowed a minimum tick size of 1 cent, which resulted in decreased liquidity in already illiquid stocks and increased algorithmic trading and speculative activity especially in already liquid stocks. Note that while decimalization is often cited as the source of the erosion in the U.S. equity markets, it was actually the combined effects of the Order Handling Rules and Regulation ATS that likely eroded most of the economic incentive to support small-cap stocks (and with it, the small IPO market).
- **Regulation NMS (national market system) (2005)** implemented several rules to improve U.S. exchanges and overhaul their structures. Despite prohibiting sub-penny

stock quotes, the SEC allowed certain exceptions for quoting and trade execution in these increments, such as dark pools, algorithmic trading or broker-dealers providing price improvements to a customer order. The exception became the rule, and many more trades were executed at sub-penny increments, further cementing the erosion of trading spreads that occurred between 1997 and 2001.

As Exhibit 1 (see page 8) illustrates, prevailing tick sizes declined with the implementation of each of these rules, leading to the drastic drop in small company IPOs that occurred before Sarbanes-Oxley (SOX). The JOBS Act rolled back the cost of SOX 404(b) compliance for emerging growth companies (EGCs). However, the much bigger blight on the small IPO market is clearly the deterioration in tick sizes (and commissions), since this deterioration was concurrent with the drop in small IPOs. While these regulations were meant to reduce trading costs for investors, they have resulted in unintended consequences that are significant — decreasing the number of small-company IPOs, increasing the management burden of being a public company, and leaving a one-size-fits-all U.S. stock market where only big brands and big stocks can sustain adequate visibility with investors.

Title I, Section 106(b): The hope inside the JOBS Act

The JOBS Act was motivated in large part by our previous studies that provided the first longitudinal analysis for the secular decline in the IPO and listed stock markets in the United States. Grant Thornton's Capital Markets Series now includes *Why are IPOs in the ICU?* (2008), *A wake-up call for America* (2009), *Market structure is causing the IPO crisis* (2009), *Market structure is causing the IPO crisis — and more* (2010) and *The tipping point: Is stock market structure causing more harm than good?* (2011).

These studies established the following:

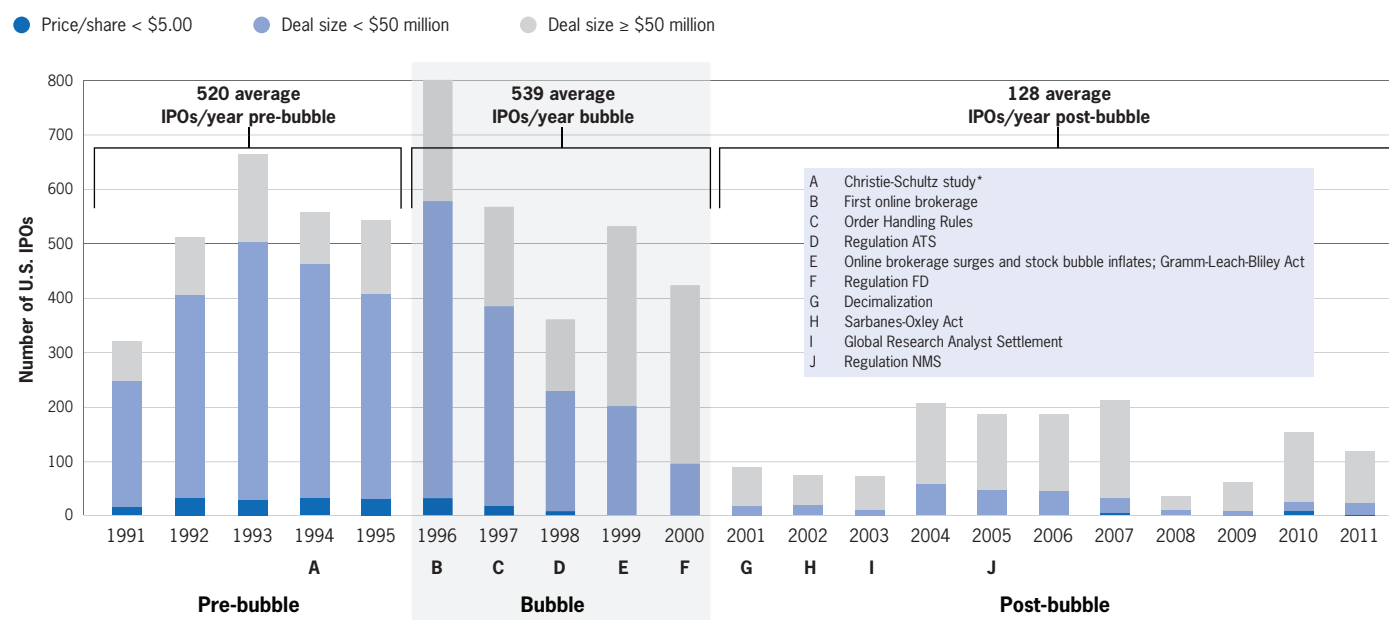
- Small (sub-\$50 million) IPOs dropped dramatically in 1998

with the implementation of Regulation ATS. This was the biggest one-event collapse in tick size in the modern history of U.S. stock markets, from 25 cents per share to 3.125 cents per share.

- The small IPO market never recovered from the implementation of Regulation ATS.
- The small IPO historically represented the lion's share (nearly 80%) of the U.S. IPO market.
- The dramatic drop in the small IPO market occurred four years *before* the Sarbanes-Oxley Act of 2002 — the scapegoat of both the IPO and public company equity listing declines.

Exhibit 2: The U.S. IPO market is broken

In the last decade, the number of IPOs has fallen dramatically, specifically deals less than \$50 million in proceeds



Sources: Grant Thornton LLP, Capital Markets Advisory Partners LLC and Dealogic. Includes corporate IPOs as of Dec. 31, 2011, excluding funds, REITs, SPACs and LPs.

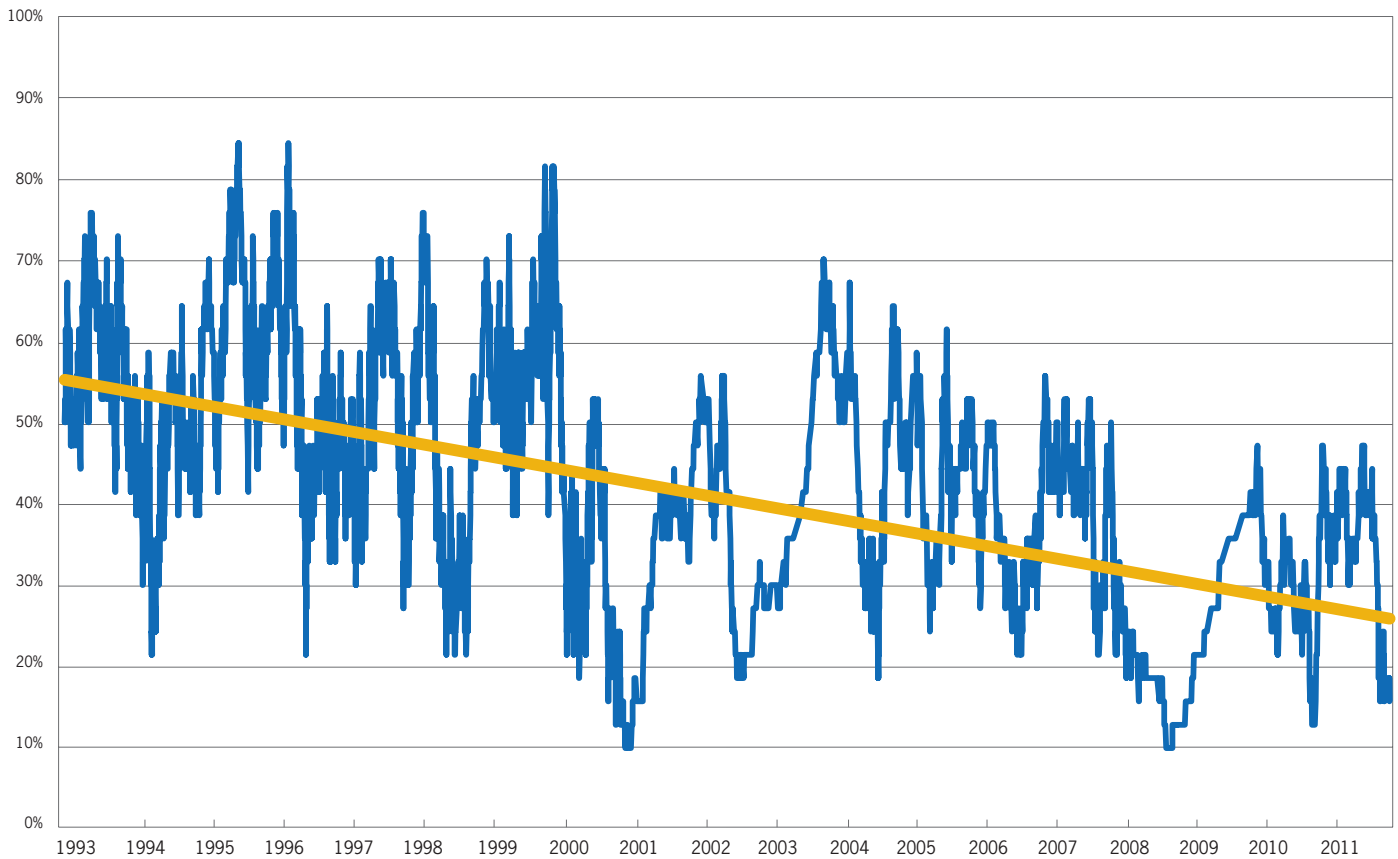
*Christie, William G., and Schultz, Paul H. "Why do NASDAQ Market Makers Avoid Odd-Eighth Quotes?" *Journal of Finance*, Vol. 49, No. 5, 1994.

- There is a secular decline in IPO success rates that is independent of the Sarbanes-Oxley Act. Companies going public today are failing at increasingly higher rates as more deals are being withdrawn, priced below their initial filing range and trading below their offer price. This decline in IPO

success rates has been exacerbated by the steady degradation in equity sales coverage of institutional and retail investors that is a reaction to the erosion in economic incentives from historically higher bankable spreads and commissions.

Exhibit 3: IPO success rates are in secular decline

Success rate of all IPOs



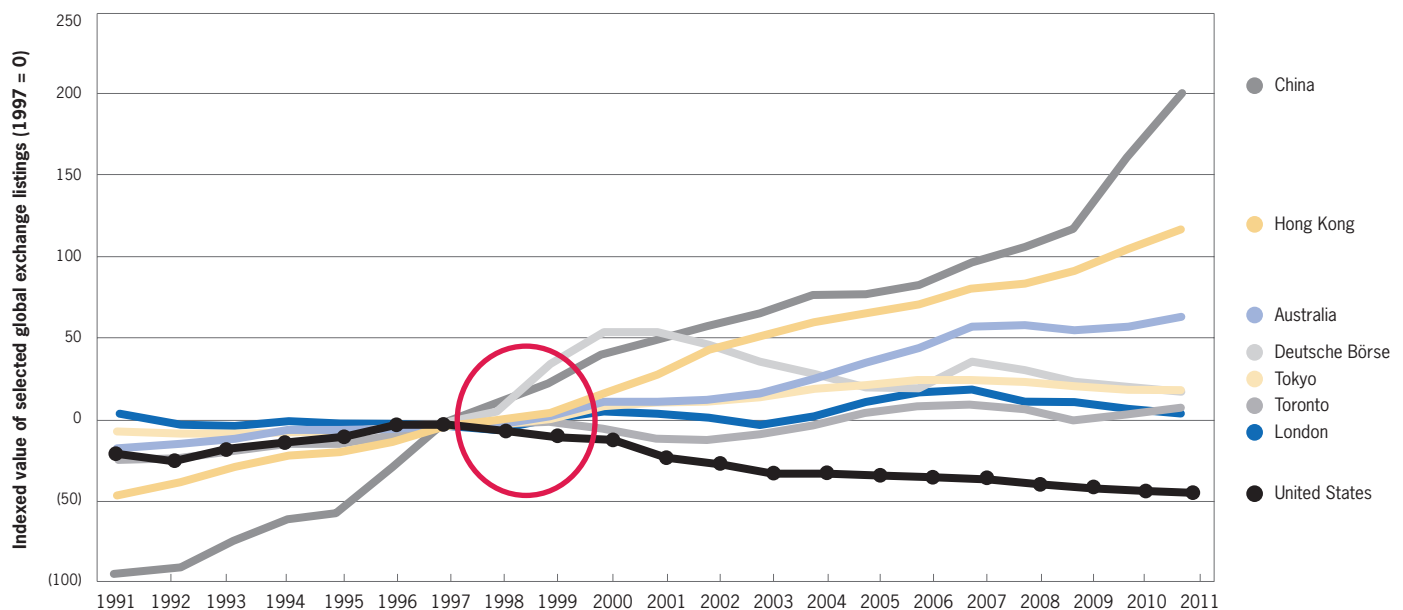
Source: Capital Markets Advisory Partners LLC. Includes only corporate issuers, excluding funds, MLPs, SPACs and REITs. Based on the average success rate of the last 30 filed deals, up to one year ago. A successful deal is defined as: 1) priced within one year of filing, 2) priced at or above the low end of the filing range, and 3) trading at or above issue price one month after pricing.

- As of year-end 2011, the number of publicly listed companies in the United States has declined 43.5% since the peak in 1997. The U.S. stock markets require nearly 388 IPOs a year to replace what is delisted every year, versus the actual annual number of 128 IPOs per year since the dot-com bubble burst in 2000. If we excise the post-bubble period of 2000 to 2003 to normalize the data, the market from 2004 through 2011 would require 288 IPOs a year to replace what is delisted every year, versus the actual number of only 146 IPOs per year.
- The U.S. stock markets should be producing between 500 and 1,000 IPOs per year. In our view, stock market structure

modifications, beginning with the Order Handling Rules and Regulation ATS, have cost Americans millions of jobs (by depriving companies of public and private capital), depressed economic growth and placed a drag on investment returns (which track economic growth).

The JOBS Act is an important first step to encourage small businesses to access U.S. capital markets, spur innovation, generate new jobs and revitalize the U.S. economy. It delivered two of the three legs of the stool required to revive the IPO market: 1) a framework to lower costs for small companies accessing the public markets, and 2) a framework to improve

Exhibit 4: The U.S. listed markets – unlike other developed markets – have been in steady decline, with no rebound, since 1997



Sources: Grant Thornton LLP, Capital Markets Advisory Partners LLC and World Federation of Exchanges. Based on the number of listed companies at year-end; excluding funds. Data as of Dec. 31, 2011.

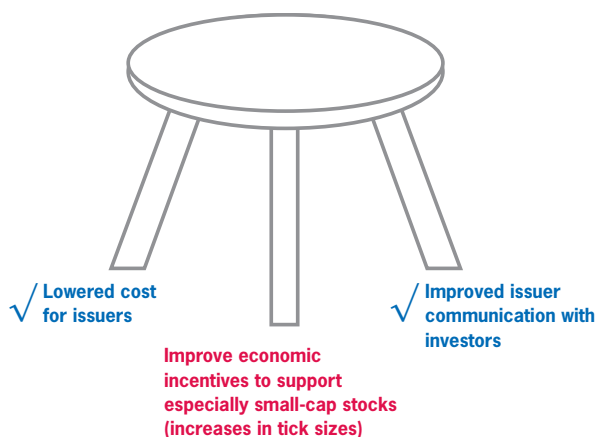
company communication with investors in the public and private markets. There is, however, a fatal flaw in the U.S. stock market structure that now needs to be addressed — namely, the third leg of the stool: the loss of the economic incentives required to sustain interest in small-cap stocks once they are public. Without adequate aftermarket incentives to support small public companies, the major IPO market recovery that was intended by the JOBS Act will not be achieved.¹⁰ Without an incentive-driven mechanism to support unknown and largely invisible companies (the vast majority of public companies) in the aftermarket for secondary liquidity, stock prices will languish, companies will continue to delist at an alarming rate, and the IPO market will

not recapture the shine that once led foreign markets to envy the U.S. stock market.¹¹

The JOBS Act materially improved the utility of Rule 506 of Regulation D offerings (by removing the prohibition against general solicitation) and raising the upper limit of Regulation A offerings from \$5 million to \$50 million. There is additional work to be done, however, concerning preempting state regulation more broadly. The secondary market (aftermarket) for Regulation D private placements is still subject to state regulation (Blue Sky Laws), and the primary and secondary markets for Regulation A offerings are generally subject to state regulations, as well. Although the SEC published the proposed rule, “Eliminating the prohibition against general solicitation and general advertising in Rule 506 and Rule 144A offerings” on August 29, 2012, the rule will be open for comment for at least 30 days and it will be a while longer before a final rule is published. We are also waiting on SEC rules that will govern what attorneys have taken to calling “Regulation A+.” State regulations currently add cost and uncertainty to issuers, brokers and investors, and they will inhibit the full development of these markets if they are not addressed. Thus, through the application of state regulation to private markets and penny tick sizes in public markets, the United States lacks a fully functional secondary market in either the private or the public market.

In passing the JOBS Act, Congress recognized the need for greater insight and analysis of U.S. market structure, specifically

Increased economic incentives (e.g., tick sizes) are the third leg of the stool.



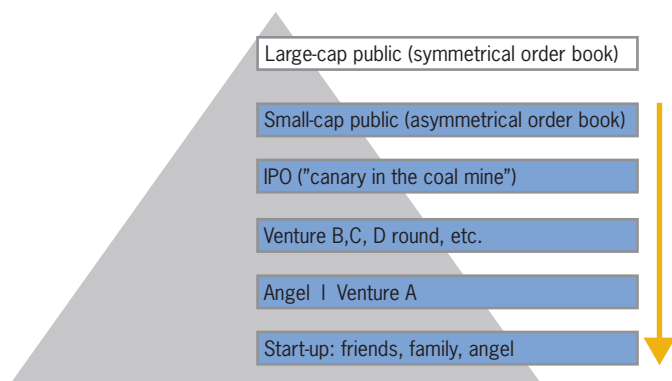
Sources: Grant Thornton LLP and Capital Markets Advisory Partners LLC.

¹⁰ Some will argue that private markets will pick up the slack, given relaxations to Regulation D offerings. However, there are no information standards of transparency and disclosure in private markets, and the rescission against the prohibition of general solicitation that applies to a Rule 506 private placement does not extend to the aftermarket for so-called secondary shares.

¹¹ In July 2011, one of the authors visited the London Stock Exchange and a wide array of institutional investors and market-making firms. When asked, those participants consistently cited the U.S. IPO market as what they once had envied about U.S. stock markets (specifically, Silicon Valley and the country's former ability to birth entirely new, sometimes capital-intensive, industries such as biotechnology, semiconductors and the personal computer). Increasingly, it is apparent that foreign market professionals no longer envy our markets. Arnuk, Sal, and Saluzzi, Joe. “Killing the Stock Market That Laid the Golden Eggs,” *Broken Hearts*, July 7, 2012.

asking the comptroller general to study the impact of state regulation on Regulation A, and instructing the SEC to study the impact of decimalization on the number of IPOs and liquidity for small- and mid-cap company securities.¹² The JOBS Act also allows the SEC to set a minimum trading increment (1 cent to 10 cents) if it determines that EGCs should be traded and quoted in trading spreads greater than 1 cent. While this provision of the JOBS Act covers only EGCs, we believe all companies, regardless of their market value, would clearly benefit from the support created by higher tick sizes. At a minimum, Congress should allow increased tick sizes for public companies with under \$2 billion in market value. An optimal solution, however, would be for Congress to allow higher tick sizes for companies

The degradation of support for small-cap public companies ripples through the private company market and likely depresses job formation in both markets.



Sources: Grant Thornton LLP and Capital Markets Advisory Partners LLC.

of all market value sizes so that even large-cap companies can consider using it as a tool to dampen speculative trading and restore investor confidence. Even a company as large as Apple might want to discourage speculative activity and favor long-term investors by taking their tick size up slightly, or even making them smaller to encourage trading. Higher tick sizes will put markets more clearly back into the hands of investors and restore their confidence. It will also eliminate the risk of a two-tiered market, if the choice of tick size is available across all companies.

Tick proliferation and quote flickering damaged the economy

Tick proliferation,¹³ which has led to a loss of economic incentives to make markets, and quote flickering,¹⁴ are the flesh-eating bacteria of the infrastructure needed to support the IPO market and aftermarket.

Small ticks deprive the “on-ramps” (small investment banks) of the economics needed to sustain infrastructure, and these firms react by eating away at (cutting back on) the distribution needed to reach investors, the capital and capital committers required to support institutional liquidity, and the amount and quality of research coverage committed to small-cap stocks. This erosion of small-cap support creates a domino effect that ripples through the IPO, venture and start-up markets.

Quote flickering has increasingly become a thorny issue with the relentless advances in technology utilized by high-frequency and other algorithmic traders, but it is also a concern with markets where high-frequency trading is less evident.¹⁵ As far back as 2001, in the immediate aftermath of the implementation of decimalization, the SEC recognized the potential harm that could arise from this phenomenon.

¹² JOBS Act, Title I, Section 106(b)(6)(A), “Tick Size, Study and Report.”

¹³ Tick proliferation is the decrease in tick sizes.

¹⁴ Quote flickering is measured by the rapid and repeated updates to the National Best Bid and Offer (NBBO).

¹⁵ Based on recent conversations one of the authors had with R. Cromwell Coulson, president, CEO and director of OTC Markets Group.

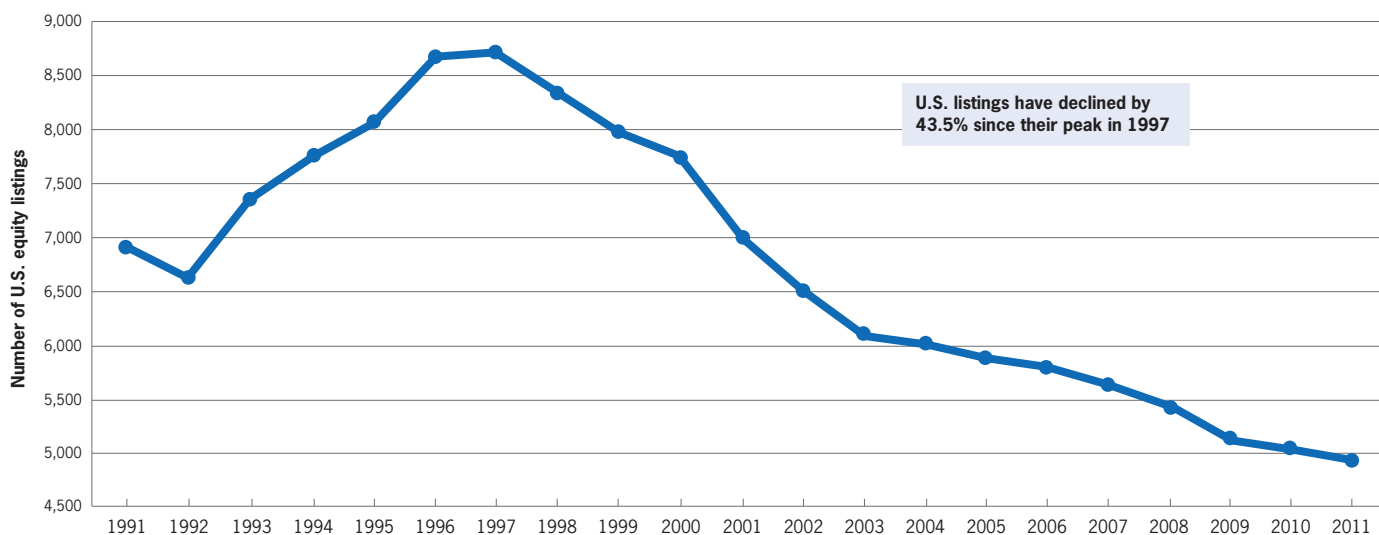
In a speech before the Exchequer Club on July 18, 2001, in Washington, D.C., **Acting SEC Chairman Laura S. Unger** said,

“Rapidly changing quotes in a sub-penny environment could have ramifications on market rules limiting ‘locked’ and ‘crossed’ markets and trading at inferior prices. These various rules are dependent upon being able to identify the best bids and offers at a given point in time — a feat not easily accomplished when any given quote is only visible for a brief moment.”¹⁶

Quote flickering has increased dramatically with the growth of high-frequency trading and its inherent rapid order placement and high cancellation rates. Despite the claims by high-frequency proponents that they add liquidity to the market, such transience in the actual best bid and offer cannot help but undermine consumer confidence in the quality of trade execution because it creates a perception of market instability in the minds of retail investors, even if no such instability actually exists.¹⁷

As a result of this steady erosion in resources committed to capital formation and aftermarket support, the ability of U.S. markets to originate and support new listings is well below the replacement levels needed to support economic growth. The total number of U.S.-listed companies has shrunk every year since 1997 — down 43.5% through year-end 2011 — exceeding the number of new IPOs joining U.S. exchanges (see Exhibit 5).

Exhibit 5: The decline in U.S. listings



Sources: Grant Thornton LLP, Capital Markets Advisory Partners LLC and World Federation of Exchanges. Listings data as of Dec. 31 of each year; excluding funds.

¹⁶ www.sec.gov/news/speech/spch509.htm.

¹⁷ An excerpt from an April 10, 2010, letter from Chris Nagy, the head of order strategy and co-head of government relations at TD Ameritrade, to the SEC. Nagy's comments, made in response to the SEC's concept release on market structure, foreshadowed the flash crash, which occurred just one month after his letter.

While 388 new listings per year are needed to maintain a steady number of listed companies, the United States has averaged only 128 IPOs per year since 2001 (see Exhibit 2, page 10).¹⁸

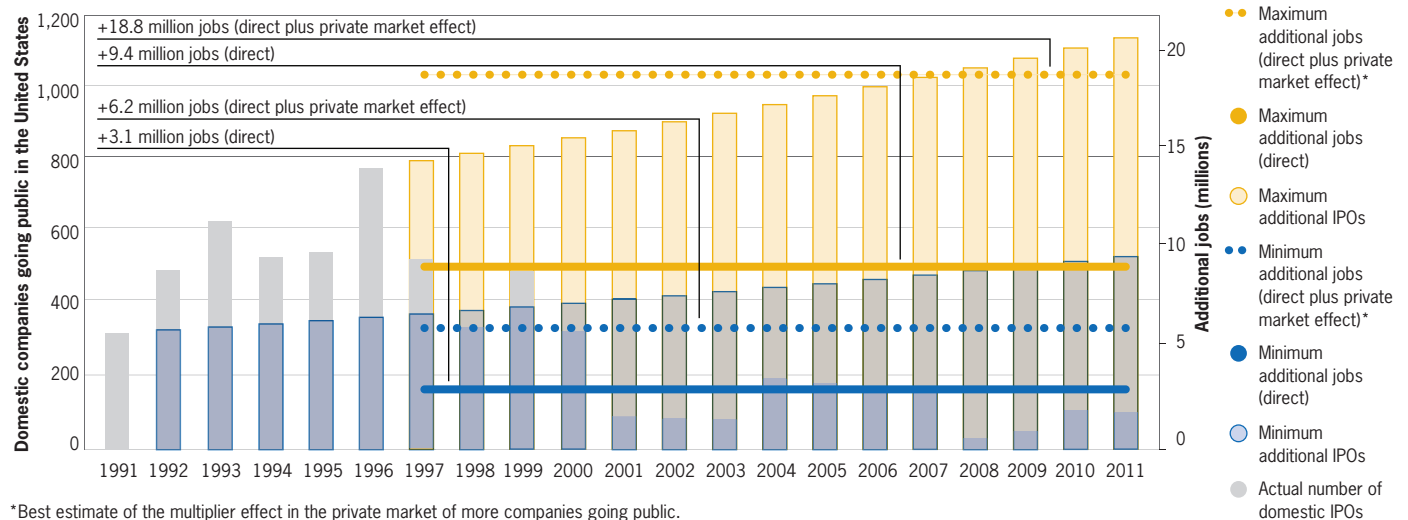
This has resulted in the following:

- **Lower growth:** Efficient markets need to do more than create rock-bottom trading costs for market speculators. Such nearsighted actions, while attempting to alleviate stress for one constituency, have served to destroy the economics for the entire ecosystem. Markets also need to improve the allocation of capital and enhance long-term economic growth. U.S. economic growth will continue to be inhibited by inefficient stock pricing discovery due to the degradation

of small company research, marketing support and capital (liquidity) provisions.

- **Job loss:** In today's stock market structure, most small companies' exit strategies no longer include a public listing, but rather a merger or acquisition. When these companies cannot raise capital effectively through the IPO market, they must look to a merger or acquisition, and jobs are lost, not gained. This represents an opportunity cost of millions of jobs and untapped economic growth. We estimate that this dearth of IPOs has cost the United States as many as 9.4 million additional jobs that might have been created after companies go public. If we add the private market effect (our best estimate of the multiplier effect in the private market when more companies go public), the number of additional jobs increases to 18.8 million (see Exhibit 6).

Exhibit 6: A major contributor to employment



*Best estimate of the multiplier effect in the private market of more companies going public.

Sources: Grant Thornton LLP, Dealogic and the U.S. Department of Commerce Bureau of Economic Analysis.

Domestic corporate companies going public in the United States as of Dec. 31, 2011, excluding funds, REITs and other trusts, SPACs and LPs.

Assumes an annual growth rate of 2.57% (U.S. real GDP growth, 1991-2011) and 822 jobs created on average post-IPO (see "Post-IPO Employment and Revenue Growth for U.S. IPOs," *Kauffman Foundation*, May 2012).

¹⁸ If we excise the post-dot-com bubble period of 2000 to 2003 to normalize the data, the market from 2004 through 2011 would require 288 IPOs a year to replace what is delisted each year versus the current number of only 146 IPOs per year.

Growing recognition that tick sizes must be increased (at least for small-cap stocks)

An increasing number of stock market and securities industry experts have recently come out in favor of increasing tick sizes — whether for all stocks, limited to small-cap stocks, or by giving issuers control over their own tick sizes. This is a solution we favor, also backed by Professor James Angel of Georgetown University. See our “Recommendations and conclusions” (page 37). Also see Appendix A (page 41), where we have, with the help of Adele Hogan, drafted a bill that we hope will create a starting point for Congress.

In the table below, we summarize recent views — overwhelmingly in favor of increasing tick sizes — that were culled from a combination of 1) press accounts, 2) letters submitted to the SEC, and 3) congressional testimony (House Subcommittee on Capital Markets and Government Sponsored Enterprises, June 20, 2011).

Growing recognition that some or all tick sizes must be increased

Name	Title	Firm or institution	Vantage point	Position	View
James Angel	Associate Professor	Georgetown University	Noted academic	For	Issuers, not the regulators, should decide what the spread should be in stocks. But if a company trades better with sub-penny pricing, then sub-penny should be permitted. ¹⁹
Larry Tabb	CEO	Tabb Group	Noted market structure analyst	For	Dime spreads should not be off the table and [should be] considered as well. This would incentivize brokers to trade and provide research for smaller and new companies. ²⁰
Joe Ratterman	President and CEO	BATS Global Markets	Stock exchange	For	We would support an industry review of tick sizes and believe that in some cases the industry should consider quote increments less than a penny, and in some cases quote increments in nickels, dimes, or quarters probably makes sense as well. ²¹
Daniel Coleman	CEO	GETCO	Electronic market maker	For	Orders, particularly retail orders, would routinely receive better-priced executions if the minimum tick size were correlated to the share price of the security. ²²

¹⁹ D'Antona Jr., John. “Wider Spreads and Fees Could Help Restore Investor Confidence,” *Traders Magazine Online News*, June 1, 2012.

²⁰ *Ibid.*

²¹ Ratterman, Joe. “Customer segmentation — a fundamental shift for exchanges,” FTSE Global Markets, July 23, 2012.

²² U.S. House of Representatives, Committee on Financial Services, Subcommittee on Capital Markets and Government Sponsored Enterprises hearing, *Market Structure: Ensuring Orderly, Efficient, Innovative and Competitive Markets for Issuers and Investors*, June 20, 2012.

Growing recognition that some or all tick sizes must be increased (continued)

Name	Title	Firm or institution	Vantage point	Position	View
Kevin Cronin	Global Head of Equity Trading	INVESCO, speaking on behalf of the Investment Company Institute	Mutual fund industry	For	We quite clearly are supportive of trying a pilot program with traditional tick sizes being moved from a penny to 5 cents or more. We certainly would have all kinds of interest in being very involved in that process, because, at the end of the day, it is our investors' money that you're looking to get more engaged in this. More transparency, better liquidity. We think a pilot program would help us get to a better place with that. ²³
Joe Gawronski	President and Chief Operating Officer	Rosenblatt Securities Inc.	Institutional agency broker	For	We support experimentation by regulators and legislators to provide new incentives for making markets in the shares of smaller companies. The provision of the recently adopted JOBS Act requiring the SEC to study whether wider minimum price increments would improve market quality for emerging-growth companies is one example of measures that could address this issue. ²⁴
Thomas Joyce	Chairman and CEO	Knight Capital Group	Electronic market maker	For	We think the opportunity to widen spreads so that liquidity aggregates in places that people can more visibly see as opposed to having to trade in penny spreads all the time would be a net benefit [for small-cap companies' capital formation]. If spreads widen, market makers might have an opportunity to have a more profitable business, and it might attract more sponsorship for more companies. I think that is something that is a likely outcome if spreads widened in an appropriate fashion...and there are a lot of firms that will tie research coverage to market making. ²⁵
Duncan Niederauer	CEO	NYSE-Euronext	Listed stock exchange	For	We think SMEs [small- and medium-sized enterprises] are overly burdened by some earlier regulations. ...We would be very in favor of experimenting with allowing companies to select their own tick size. Ultimately you could argue that could be their decision. We've studied internally what we think it would take for us to implement something like that; I don't think the implementation process would be long. ²⁶
Cameron Smith	President	Quantlab Financial, LLC	Quantitative trading	For	Policymakers should create categories of stocks with different quote increments. While decimalization and penny increments have saved investors hundreds of billions dollars, a one-size-fits-all approach, regardless of whether a stock trades at \$5 or \$500, does not make sense. I tend to favor the calibrated tick size approach, but at the same time I also favor innovation. So, to the extent that one of the exchanges wants to experiment with having bigger tick sizes for some small-cap companies or up-and-coming companies, and wants to have a pilot [program] to do that, I would be supportive of that as well. ²⁷

²³ *Ibid.*

²⁴ *Ibid.*

²⁵ *Ibid.*

²⁶ *Ibid.*

²⁷ *Ibid.*

Growing recognition that some or all tick sizes must be increased (continued)

Name	Title	Firm or institution	Vantage point	Position	View
Dan Mathisson	Head of Equity Trading	Credit Suisse Securities	Algorithmic trading	Neutral	We would have no problem with an experiment to allow corporates to choose their own tick sizes. I think that it would not make a significant difference in the IPO markets or in the ability to raise capital. ...I do not think it would harm the markets, but I don't think it would significantly help either. ²⁸
William O'Brien	CEO	Direct Edge	Stock exchange	For	Regulation should be made more flexible to enhance the trading experience for smaller companies. An unintended consequence of Regulation NMS is the tendency to impose a "one-size-fits-all" version of market structure on issuers, regardless of their characteristics and needs. The potential widening of tick sizes can definitely help increase the liquidity at the bid and ask. ²⁹
Jim Toes	President and CEO	Security Traders Association	Trade group	For	The unintended consequences of decimalization have been dramatic, most noticeably, in the significant decline in the quantity of liquidity providers in the stocks of smaller- and medium-sized companies and those with less than active trading markets. [In establishing a pilot program to study tick size changes] we would focus on dollar volume traded rather than the price of the security or market cap, because that is the best indicator for how much natural customer flow resides in a particular stock. ³⁰
Jeffrey Solomon	CEO	Cowen and Company	Growth company investment bank	For	<p>One of the principal reasons for the lack of liquidity in small-cap stocks can be directly attributed to the advent of decimalization. Congress and the regulators should consider increasing the tick increment for emerging growth companies or allow companies to determine their own increment size.³¹</p> <p>By increasing the tick size for small-cap companies, investment banks would be appropriately incentivized to provide increased aftermarket support for these issuers by committing firm capital to support market-making in these securities. Let me be clear, this capital commitment is not proprietary trading; it is merely ensuring inventory is available to provide liquidity to customers. Increasing the tick size would also make it easier for an investment bank to commit more resources, including research coverage, to smaller companies thereby increasing the ability of smaller companies to access the public equity markets. ...By increasing the tick size, I believe the IPO market for smaller transactions and for smaller companies will re-open significantly, thereby providing emerging companies with the growth equity capital they need for the development of their businesses and [to] create more jobs here in the U.S.³²</p>

²⁸ *Ibid.*

²⁹ *Ibid.*

³⁰ *Ibid.*

³¹ *Ibid.*

³² Cowen and Company letter to the SEC Advisory Committee on Small and Emerging Companies, June 4, 2012.

Growing recognition that some or all tick sizes must be increased (continued)

Name	Title	Firm or institution	Vantage point	Position	View
James Fehrenbach and Bradford Pleimann	Managing Director and Head of Equity Institutional Sales; Managing Director and Head of Equity Trading	Piper Jaffray	Growth company investment bank	For	Larger minimum trading increments (“tick sizes”) are essential to revive support for the IPO and small capitalization markets. Without higher tick sizes, we believe that The JOBS Act will fail to broadly revive the IPO market and job growth — clear intents of Congress. The regulatory changes noted above — not just Decimalization but the changes that preceded Decimalization, created a U.S. equity market that is now geared to the trading of large capitalization stocks but has caused the steady erosion in aftermarket support (including liquidity) for small capitalization stocks. We believe that there is ample IPO “manufacturing capability” in the United States and an ample number of companies that could qualify to go public if the aftermarket support problem was solved through adequate economic incentives (increases in tick sizes). ...Increases in tick sizes, we believe, would do more for capital formation and job growth than all the other provisions of The JOBS Act, combined. It is the “missing link” for firms like Piper Jaffray, which have a long tradition of serving the growth company marketplace. ³³
Phil Johnston	Partner, Head of Equities	ThinkEquity LLC	Growth company investment bank	For	In discussions with both sides of our business, quote increments or higher tick sizes could be essential to help create more investment and quite frankly enable the recreation of firms like Hambrecht & Quist, Montgomery, Robertson Stephens, and Alex Brown. Firms that were maniacally focused on supporting innovation and supporting small cap stocks from seed financings, all the way through to the IPO process and as small-cap public companies. ...Wider quote increments are essential to help revive support for the IPO and small capitalization markets. Without wider quote increments and other initiatives, The JOBS Act will fail to broadly revive the IPO market and job growth. ...We need to change the following statement, “When is the last time you heard about a company that wanted to go public?” The current environment needs to change so that statement can read, “We are excited to access the public markets” instead. Quote increments can be one step to encourage investment in growth and jobs. ³⁴

³³ Piper Jaffray letter to the SEC Advisory Committee on Small and Emerging Companies, June 8, 2012.

³⁴ ThinkEquity letter to the SEC Advisory Committee on Small and Emerging Companies, June 8, 2012.

The SEC's *Report to Congress on Decimalization*: Missing the forest for the trees

According to the **National Center for Children in Poverty**, “Nearly 15 million children in the United States — 21% of all children — live in families with incomes below the federal poverty level — \$22,350 a year for a family of four. Research shows that, on average, families need an income of about twice that level to cover basic expenses. Using this standard, 44% of children live in low-income families.”³⁵

The SEC's *Report to Congress on Decimalization* (the SEC Report) acknowledges the key “transition” period of 1996–1998 (the Manning Rule, The Order Handling Rules and Regulation ATS) when most of the damage was done to market incentives as effective tick sizes moved from 25 cents to 12.5 cents to 3.125 cents, but it focuses on the comparatively minor transition that took tick sizes from 3.125 cents to 1 cent with the advent of decimalization in 2001 in its analysis. The SEC Report analyzes trees (academic studies, none of which measures the long-term impact of changes to market structure on capital formation and jobs) but needs to also consider the forest (the long-term impact of market structure changes on the stock market ecosystem):

- *The United States has 43.5% fewer listed public companies since the peak in 1997.*
- *The United States is averaging a fraction of the IPOs that it did in the 1990s and 1980s.*
- *Today's stock markets contribute to unemployment, add to the budget deficit and indirectly contribute to childhood poverty.*
- *The major structural damage occurred during the period leading up to decimalization (1996 to 1998), not with decimalization (the “coup de grâce”) in 2001.*

The SEC Report concludes:

“The Staff believes that the Commission should solicit the views of investors, companies, market professionals, academics, and other interested parties on the broad topic of decimalization,

how to best study its effects on IPOs, trading, and liquidity for small and middle capitalization companies, and what, if any, changes should be considered.”

However, we believe the forest is on fire.

Fact: The small IPO market fell off a cliff in 1997 and 1998 when the Order Handling Rules and Regulation ATS combined to gut achievable spread economics to dealers (see Exhibit 1, page 8).

Fact: The small IPO market (traditionally more than 70% of IPOs) never recovered (see Exhibits 1 and 2, pages 8 and 10).

Fact: The U.S.-listed stock markets are in a steady state of erosion, having lost listed companies *every single year* since 1997 (see Exhibits 4 and 5, pages 12 and 15).

Fact: More capital formation would drive entrepreneurship, job growth, investment returns and tax revenues (see Exhibit 6, page 16).

Fact: The SEC has the authority to make changes that will improve capital formation, entrepreneurship, job growth and tax revenue.³⁶

A nation the size of the United States needs more than one stock market structure. We recommend that the SEC begin experimenting with multiple public market structures that might reasonably kick capital formation and job creation into high gear. There is little downside for the American people, and clearly there is tremendous upside if we can get it right.

³⁵ www.nccp.org/topics/childpoverty.html.

³⁶ www.sec.gov/about/whatwedo.shtml.

The SEC's empirical findings

The empirical findings rely on short-term quantitative analysis by micromarket economists. This approach does not generally study the long-term impact of market structure changes on the stock market ecosystem (notably the number of bookrunning managers of IPOs, institutional and retail sales, the depth of equity research coverage and capital commitment) that may in the aggregate be essential to sustain a robust IPO market and with it, to adequately support U.S. growth.

In this section, we quote verbatim the SEC's nine findings and offer our perspective, as seasoned practitioners with an analytical bent, as to why we are troubled by this analysis.

1. Spreads

The SEC Report concludes:

Main empirical finding of the academic literature: Both effective and quoted spreads declined after decimalization. However, there is some evidence that, at least for NASDAQ small capitalization stocks, the decline is not statistically significant. The effect of decimalization on institutional transaction costs is mixed.

We observe:

- Effective and quoted spreads are not the only relevant notions — a concept of bankable spread must be considered:
 - The SEC analysis takes the perspective of an investor executing a trade and not the perspective of a market maker committing capital. An essential concept is “what is the bankable spread” that market makers can rely on to compensate themselves for taking on risk positions (i.e., committing capital to the purchase or shorting of a stock). In an electronic market, where anyone can step in front of a market maker for 1 cent, that bankable spread is 1 cent. Contrast this to the early 1990s.

In a quote-driven market, a market maker could quote at a quarter-point spread, buy at the bid, mark up to the ask side of the market, and earn a 25-cent spread — thus, the bankable spread was 25 cents. The SEC focuses on multiple academic definitions of spreads that are divorced from the reality of operating a market-making business that employs salespeople, commits capital and issues equity research opinions.

- The analysis also generally ignores the period from 1996 to 1998, when the larger changes to bankable spread and tick size were made.
- The analysis concludes that the academic studies “...are contrary to the argument of...the Grant Thornton paper...that the spreads of small stocks declined significantly.” In fact, when you understand that we are focused on “bankable spread,” then you begin to understand that indeed, we are correct: Minimum tick size is the upper limit of the bankable spread.

2. Depth

The SEC Report concludes:

Main empirical finding of the academic literature: Quoted depth, on average, declined after decimalization, but cumulative depth at competitive prices did not change.

We observe:

- This section focuses on the “trees” without asking the question “What is the impact on the forest?” We are troubled by this measurement of short-term effects where cumulative depth did not immediately change. It takes years for systems to adjust, jobs to be cut, and predatory computer trading (front-running) practices to emerge. The academic literature appears largely silent on the long-term impact on our markets.

3. Execution speed

The SEC Report concludes:

Main empirical finding of the academic literature: The total time to work institutional orders appears to have increased after decimalization.

We observe:

- We agree: Institutional liquidity has declined.
- Anecdotally, institutional liquidity has declined significantly in small-, micro- and nano-cap stocks. This is consistent with the academic literature, which concludes that smaller tick sizes make illiquid stocks more illiquid.

4. Trade size

The SEC Report concludes:

Main empirical finding of the academic literature: Trade sizes generally fell after decimalization, particularly for more liquid stocks.

We observe:

- The bigger question is “Why have trade sizes fallen?” This has more to do with the computerization of trading, and the ability of algorithmic traders and high-frequency traders to step in front of institutional orders. One important strategy has been to put large orders into computer “wood chippers,” scattering them about to minimize “information leakage.”

5. Specialist/market maker participation and profitability

The SEC Report concludes:

Main empirical finding of the academic literature: Market maker participation increased after decimalization across all market capitalization categories, but decimalization does not appear to have reduced profitability.

We observe:

- This section mixes apples and oranges: It discredits the IPO Task Force Report and the Grant Thornton view that decreases in tick sizes harmed market-making profitability by discussing “specialist” data as opposed to “dealer” data. To be clear, when practitioners discuss small-cap market making, they are generally referring to the dealer market (i.e., NASDAQ pre-Regulation ATS) and not the specialist market.
- Two of the authors are former senior investment bankers with previous experience running these businesses. We know from our direct experience that the Order Handling Rules, Regulation ATS and subsequent decreases in tick sizes hurt market-maker profitability. Capital commitment to NASDAQ market making has gone the way of the dodo bird.

6. Market versus limit orders

The SEC Report concludes:

Main empirical finding of the academic literature: Decimalization does not seem to have reduced the use of limit orders, but it does appear to have decreased the size of limit orders and increased the frequency of cancellation.

We observe:

- This point does not appear to be relevant in resolving the crisis in capital formation.

7. Routing of orders

The SEC Report concludes:

Main empirical finding of the academic literature: Decimalization has not caused substantial changes to order routing practices, but it may have prompted traders, particularly large institutions, to seek more volume through floor orders.

We observe:

- This point does not appear to be relevant in resolving the crisis in capital formation. However, we should point out that order routing practices changed dramatically with the later implementation of Regulation NMS.

8. Volatility

The SEC Report concludes:

Main empirical finding of the academic literature: Decimalization increased volatility in the short run but decreased volatility in the long run.

We observe:

- Although stock market volatility has increased over the past decade, even after adjusting for the credit crisis in 2008 and 2009,³⁷ the forest in this case is “How does the average retail investor feel about stock market volatility, quote flickering and seeing his or her orders stepped in front of for a penny?” Decimalization (and Regulation NMS) combined to change markets in ways that we believe are steadily undermining the confidence of the average retail investor.

9. Incentives for broker promotion

The SEC Report concludes:

Main empirical finding of the academic literature: After decimalization, the reduction in relative spreads may have reduced broker incentives to promote stocks.

We observe:

- We agree. But we believe the SEC underestimates the magnitude of the loss in broker incentives, and how it has undermined the quality and breadth of distribution for IPOs:
 - Middle-market institutional sales departments that used to be commonplace on Wall Street have all been closed.
 - Institutional sales departments are increasingly dominated by hedge funds and large-cap-focused “mega” investors.
 - More institutional investors have become self-directed and are not effectively reached by Wall Street.
 - The majority of retail stockbrokers no longer market stocks as a major portion of their daily activity.

We have studied all of the academic literature and, as we testified at the SEC Advisory Committee on Small and Emerging Companies, there are two effects. First, we conclude that the current market structure has significantly harmed both institutional liquidity and dealer market makers in small-cap stocks, as it has decimated the distribution and aftermarket support for the small IPO. Second, the academic literature shows that liquid stocks are made more liquid by smaller tick sizes and illiquid stocks are made more illiquid by smaller tick sizes. Thus, one must conclude that this market structure represents the “worst of both worlds” for small-cap issuers: it harms institutional liquidity and dealers.

An increasing number of market experts, including investors, are joining in the call to increase tick sizes. In fact, the Investment Company Institute, which represents over 90 million retail investors, called for increases in tick sizes in its congressional testimony, made by Invesco in June 2012.³⁸

We hope to see more forest and fewer trees.

³⁷ “Market Swings Are Becoming New Standard,” *The New York Times*, September 11, 2011.

³⁸ [financialservices.house.gov/uploadedfiles/hhrg-112-ba16-wstate-kcronin-20120620.pdf](https://www.financialservices.house.gov/uploadedfiles/hhrg-112-ba16-wstate-kcronin-20120620.pdf).

Eating away at the “on-ramps” (small investment banks)

“The irony of all this is that the change in Order Handling Rules [in 1997] that were instituted under my watch at the [SEC] has resulted in the proliferation of markets, technologies and automation that brought about the flash crash and yesterday’s [Knight Securities] events. I think public confidence is severely shaken by things of this kind.”

Arthur Levitt, former chairman of the SEC
Bloomberg Surveillance with Ken Prewitt and Tom Keene
August 2, 2012

The U.S. IPO market has suffered a significant decline, particularly with respect to small companies. From 1991 to 2001, the number of U.S. IPOs smaller than \$50 million dropped from nearly 80% to just 20%. This decline is the unforeseen consequence of the regulations enacted between 1997 and 2001 that significantly changed the stock market structure that paid for the infrastructure of the small-broker dealers, research analysts and capital support required to take small companies public and to support them in the aftermarket. This infrastructure is analogous to the system of highways — with roads, on-ramps, bridges, tunnels and tolls — required to support commerce.

If tolls were cut and roads, on-ramps, bridges and tunnels were allowed to deteriorate, the cost to get goods to market would increase. Likewise, with the loss of tick sizes and commissions (the tolls), the stock market infrastructure has deteriorated, and public company management is left to pay the increased implicit cost of supporting liquidity in its shares — a burden many companies are unable to bear. Higher tick sizes would enable management to focus on growing the business instead of trying to find investor support for its publicly traded shares.

Economic infrastructure supporting U.S. capital markets

Stakeholders:

- **Roads** — Trade execution venues such as NYSE, NASDAQ, Direct Edge, Liquidnet
- **On-ramps** — Investment banks
- **Bridges** — Market makers (firms ready to buy/sell stocks continually) committing capital
- **Tunnels** — Analyst and broker support to investors

Economic incentives:

- **Tolls** — Tick sizes and commissions that support the market’s operations and upkeep

Sources: Grant Thornton LLP and Capital Markets Advisory Partners LLC.

Tragic consequences for the cottage industry of on-ramps that once supported entrepreneurs

A series of uncoordinated regulatory changes aimed at cutting transaction costs has led to a number of negatives — not only for small companies and the small broker-dealers and long-term investors that supported them, but also for the U.S. economy. Since 2001, 1-cent tick sizes no longer sustain the traditional market structure that helped numerous small companies issue IPOs. Investment banks acting as bookrunners — whose numbers, as of 2006, had decreased 77% to only 39 firms — today lose money supporting small company IPOs in the aftermarket. As a result, only 233 small companies issued IPOs between 2001 and 2007 — a 92% drop from 1991–1997 levels. Moreover, small company IPOs now represent only 20% of the total IPO market.

Decimalization and the corresponding drop in tick sizes from 25 cents to 1 cent (and even sub-pennies) caused a gradual collapse in the infrastructure small companies need to access public markets, resulting in the following:

- **A loss of profits that paid for research, sales and trading support.** Between 1994 and 2006, 129 investment banks, many of which supported small companies, exited the book-run IPO business — a decline of 77% over pre-1994 levels. Because tick sizes decreased by 96%, the remaining investment banks dramatically cut back capital commitments for small company stocks, eliminating stockbrokers and cutting the depth and breadth of research coverage offered to investors. Many small companies were delisted from exchanges, and today, weak capital commitment from investment banks remains a serious impediment to small businesses accessing U.S. capital markets.
- **Market makers being replaced by high-frequency traders that focus on large, high-volume stocks.** Only companies with high visibility, like Facebook and LinkedIn, whose brands create a demand for their shares, can survive without research, sales and trading support. After decimalization, Wall Street was forced away from serving investors in growth stocks and toward an increasingly narrow subset of very large cap-oriented and high-turnover institutions and hedge funds.

Small-cap companies and capital formation

	Before 1997	After 2001	% change
Tick sizes	\$0.25 per share	\$0.01 per share	-96%
Investment banks (acting as a bookrunner)	167 (1994)	39 (2006)	-77%
Small company IPOs	2,990 (1991–1997)	233 (2001–2007)	-92%

Sources: Grant Thornton LLP and Capital Markets Advisory Partners LLC.

Eating away at IPO aftermarket profitability (support for public companies)

Even before Regulation ATS was implemented in 1998, many people understood that it would gut the U.S. IPO market. In a letter dated February 4, 1997, addressed to NASDAQ's then-president and copied to the SEC chairman, the SEC chief economist and the chairman of the National Association of Securities Dealers, **Knight Securities co-founder Walter Raquet** warned:

“Remember you are tampering with the most efficient capital-raising and job-creating mechanism in the world — the NASDAQ Stock Market.”

Investment banks, like all corporations, are ultimately driven by simple economics. They invest and engage in profitable activities, while seeking to reduce participation in those activities that are unprofitable or insufficiently profitable to justify the investment and risk exposure.

For decades, the business of marketing, executing and supporting IPOs of all sizes was a consistently profitable venture for banks. Today, in a world in which tick sizes have been decimalized and decimated, banks can ill afford to commit human and capital resources to what used to be the vast majority of IPOs in this country, i.e., those with proceeds less than \$50 million.

While it may be tempting for contrarians to focus on the gross spread of the transaction — which has remained generally stable at 6% to 7% of total proceeds for most IPOs — this position ignores the economic reality of what the destruction of tick sizes has wrought. In fact, the majority of an investment bank's profit from an IPO once occurred after the transaction itself, from the trading and commissions generated by actively supporting the stock in the aftermarket (see Exhibit 7).

Prior to 1998 and the implementation of Regulation ATS, small IPOs — those under \$50 million — comprised 80% of all IPOs. Banks competed fiercely for this market segment — not just for their 7% but also for the revenue achievable in the aftermarket. Deals worth \$25 million, which would have

Exhibit 7: Today's investment banks lose money supporting small IPOs in the aftermarket and, as a result, provide very little 'real' support

IPO economics	1997	2007
Deal size	\$25,000,000	\$25,000,000
Number of managers	2	5
Bookrunner/senior manager's revenue		
Transaction	\$840,000	\$560,000
Aftermarket	\$1,680,000	\$(56,000)
Total revenue	\$2,520,000	\$504,000
Deal size needed in 2007 to achieve economics equivalent to 1997		\$125,000,000

Source: Capital Markets Advisory Partners LLC.

generated only \$840,000 in gross spread dollars, became the generator for twice that amount in the form of aftermarket trading and commission revenue.

The aftermarket revenue has all but evaporated for deals of this size. Today, banks routinely lose money in the aftermarket on small transactions. In this penny-spread, ultralow-commission world, there simply isn't enough float to generate enough revenue.

A further complication involves the number of banks that could be active in the stock. Before Regulation ATS, these small deals would typically be managed by one or two underwriters, which would then be the dominant traders in the aftermarket. Today, even small IPOs feature several banks on the cover, all of which are competing for the same gross spread pie, fully aware that there won't be much in the aftermarket to share. Unlike the conditions before tick sizes eroded, banks today recognize that for small IPOs, the IPO itself is the only opportunity to make any money.

“Investment banks are driven by simple economics, and the economics simply aren't there anymore in the world of small IPOs.”

Edward Kim

Grant Thornton LLP

and former head of product development at NASDAQ

Small-caps can't create systemic risk (so why not build a small-cap market to drive growth?)

“I think many of our problems with market liquidity in small- and mid-caps can be traced right back to decimalization [tick sizes],” said **Dennis Dick, prop trader at Bright Trading** in Detroit. “Where decimalization has helped to reduce spreads in the large-cap space, it has actually harmed liquidity in the small- and mid-cap space.”

For blocks, “it’s nearly impossible to execute any sizable order without significant price impact,” Dick said.

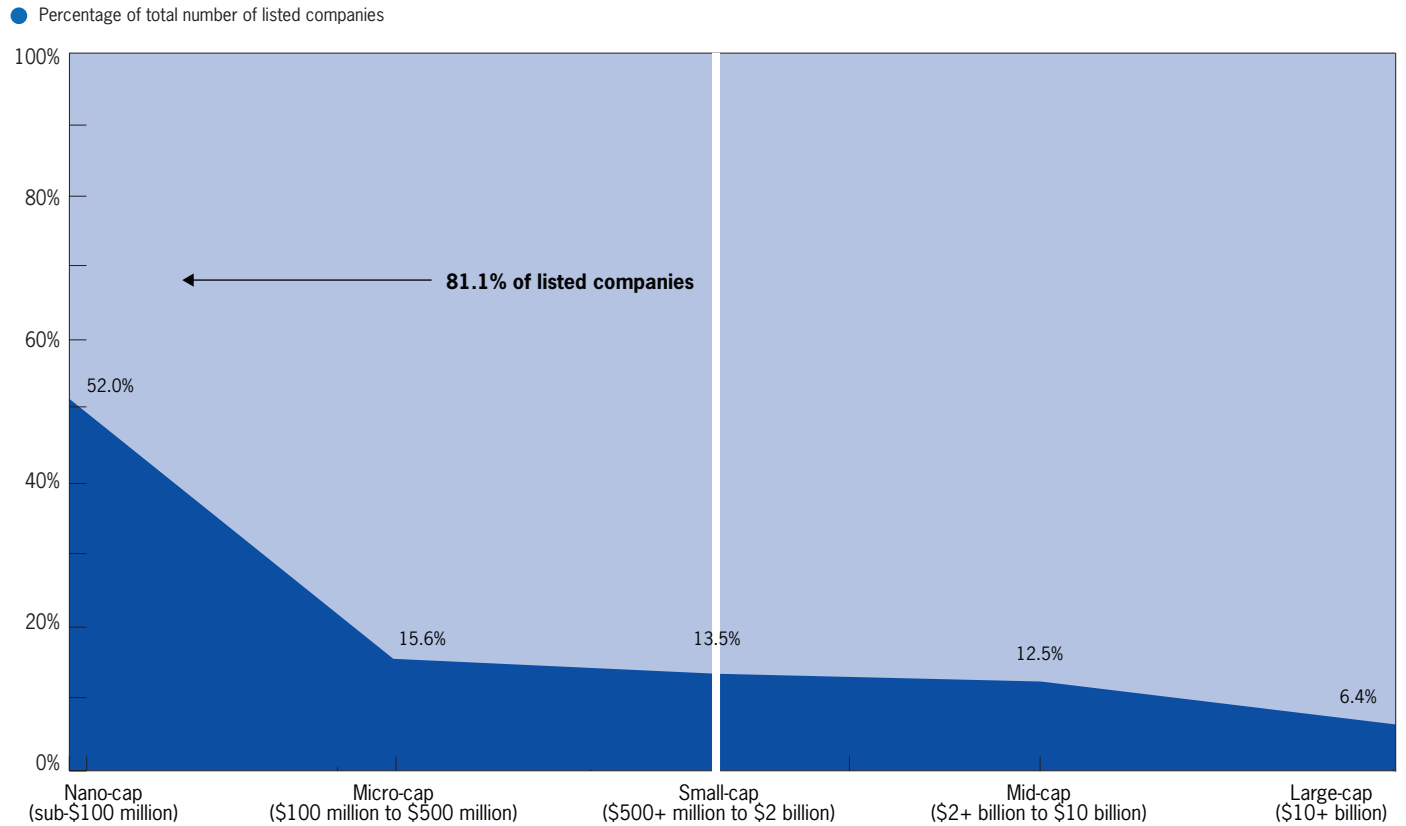
“SEC to Examine Tick Size for Small Caps”
John D’Antona Jr.
Traders Magazine Online News
April 17, 2012

Small public companies, defined as those with under \$2 billion in equity market value, while very large in number (81% of all public companies) represent only 6.6% of total equity market value (see Exhibit 8, page 29). In fact, if we look at the progressively smaller slice of companies that are micro-cap (less than \$500 million in size), we discover that again, while large in number (nearly 68% of all small public companies), these companies represent only 1.6% of total market value. The subset of the market that has been hurt the most is the sub-\$100 million market value or nano-cap companies. These issuers represent more than half of all public companies (52%, including the over-the-counter market), and yet account for only 0.33% of the total equity market value in our U.S. stock markets.

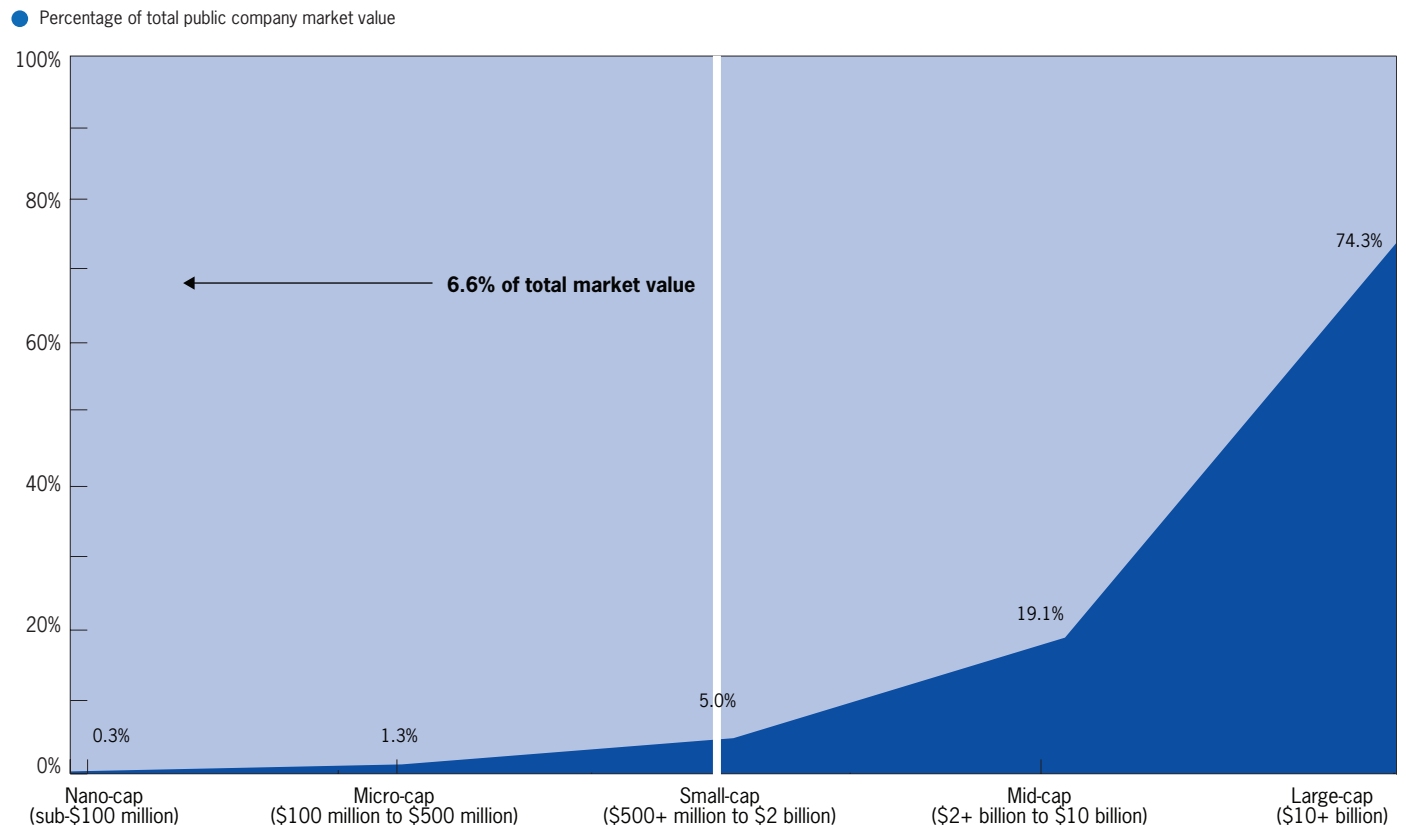
What can be presumed by the small aggregate value of small public companies?

- As a class, small public companies pose no systemic threat to the U.S. economy. Thus,
- small public companies should have a regulatory burden that is cost appropriate for their size, and
- higher transaction costs and incentives to support this market will not do significant harm to consumers and, indeed, by helping to drive the economic and job growth that so many of these companies create, will likely do consumers a great deal of good.

Exhibit 8: While 81% of all public companies are sub-\$2 billion in market value...



...sub-\$2 billion companies represent less than 7% of total public company market value



Sources: Grant Thornton LLP and Capital IQ.
Includes NASDAQ, NYSE (including AMEX) and OTC listings. Corporate issuers only, excluding holding companies, funds, MLPs, SPACs, REITs and other trusts.

The effective representation of corporations (the job creators) was destroyed

“Taxation without representation is tyranny!”³⁹

The JOBS Act is a modern-day American Revolution — corporations lost their seat at the table in the structuring of stock markets, evidence mounted that stock markets were harming issuers (job creators), and concerned Americans raised their voices to the White House and Congress. Our government responded: a tea party ensued in the form of the JOBS Act. Like the Boston Tea Party, the full impact of this one will not be known for years.

The fact remains that the interests of small and large corporations are no longer well-represented to and within the SEC — at least not within the Division of Trading and Markets. Why?

Let’s start with the notion that issuers are not concerned with understanding market structure. It isn’t their forte. Up until 1998, the SEC’s Division of Market Regulation (now known as the Division of Trading and Markets) heard mostly from the NYSE, NASDAQ and the American Stock Exchange (AMEX). Each of these stock exchanges⁴⁰ was, at the time, a member-owned organization. As part of its governance and culture, each of these institutions represented the interests of its constituencies (i.e., listed companies, investors and member firms, including investment banks, market makers and specialists) to the SEC and on Capitol Hill.

However, with the passage of Regulation ATS, that exchange-led representation of issuers to the SEC was, we believe, largely overshadowed by the proliferation of new, trading-only entrants. For example, there are now 29 so-called dark pool trading venues, and 14 exchanges and ECNs tracked by the Tabb Group’s April 2012 LiquidityMatrix.⁴¹ Of the 14 exchanges and ECNs, five trace back to the NYSE, NASDAQ and their owned entities. That still leaves a large plurality of venues whose primary interest is creating and capturing more trading volume (e.g., proliferation of ticks).

To make matters worse, we would argue that the major stock exchanges (NASDAQ and NYSE) were forced by regulatory changes to abandon membership-owned, nonprofit structures and convert to for-profit stock-based ownership — NASDAQ in 2000 by Regulation ATS and the NYSE in 2005 (reverse merger with Archipelago) by Regulation NMS. Thus began the modern era in which member firms opened dark pools to compete for trading volume against the listed exchanges, and new trading-only venues emerged that offered no listing benefits for issuers. While the NYSE and NASDAQ try their best to represent issuers, it is a common tactic for the nonlisted trading venues and high-frequency trading firms to portray, with the SEC and Congress, the exchanges’ efforts as self-serving. From where we sit, this marginalization and underrepresentation of corporate issuers is a construct that the United States can ill afford.

³⁹ The quote is commonly attributed to Massachusetts lawyer and political activist James Otis, Jr. c. 1761.

⁴⁰ NASDAQ was not technically granted “exchange” status by the SEC until 2006. While NASDAQ was generally thought of by the public as a stock exchange, the term legally requires status as a self-regulatory organization.

⁴¹ www.tabbgroup.com/Page.aspx?MenuID=47&ParentMenuID=2&PageID=46.

Investors now face U.S. capital markets that are more complex, opaque and volatile than ever before.

- **Greater complexity and volatility that undermine investor confidence:** The U.S. stock markets were once dominated by three stock exchanges (NYSE, NASDAQ and AMEX) that focused on investing and capital formation. The markets are now fragmented across 60 different venues focused primarily on trading.
- **Increase in high-frequency trading:** Lower tick sizes have led to increased market speculation, dark pools and high-frequency trading — from approximately 10% of daily U.S. trading in 2000 to more than 60% today. Rather than supporting long-term company growth by bringing research, sales and capital to investors, high-frequency traders seek to make a quick profit by identifying short-term price discrepancies.

Winners	Losers
<ul style="list-style-type: none"> • Speculators • Big investment banks • Hedge funds • Day traders • Electronic trading • Volatility • Trading-oriented institutions • Dark pools • Big company acquirers • Asia 	<ul style="list-style-type: none"> • Small companies • Entrepreneurs • Private enterprise • Small investment banks • Venture capital • Market makers • Stockbrokers (advice) • New issue distribution • Equity research • IPOs • Institutional liquidity in small-cap stocks • Transparency in small-cap stocks • Long-term investors • The United States

Why some large investment banks, large investors and stock exchanges fight for smaller tick sizes, despite their negative impact on the economy

Some large investment banks: Most large investment banks derive significant revenue from some combination of businesses that benefit from smaller tick sizes. These are likely to include:

- dark pools (internalization trading markets that depend on sub-penny executions and rebates that further cut effective tick sizes below their regulated minimum quote level of one penny per share),
- algorithmic trade execution (described by some as an “electronic wood chipper” that takes block orders of 100,000 shares or more and cuts them into 100-share increments),
- sponsored access (where high-frequency or other aggressive trading customers use the investment banks’ pipes to directly access the stock market for faster trade executions), and
- prime brokerages (where money is lent mostly to hedge funds to short — and sometimes acquire — securities).

Some large investors: One of the authors has been in meetings with the senior management of large investment firms where they have confided that, because they have the scale to employ their own research analyst staffs, lower tick sizes and commissions benefit them competitively by depriving their smaller competitors of shared services from the Wall Street firms. As a result, they will tolerate higher volatility in and erosion of the overall market and economy because they believe that they have a competitive advantage in these increasingly opaque markets. In addition, major index, exchange-traded fund and basket trading shops unquestionably benefit from lower execution costs, especially since they do not require equity research or sales services in the traditional sense.

Some stock exchanges: When many of your customers are high-frequency traders that depend on smaller tick sizes, it is difficult to take a broader market position against penny tick sizes without harming your revenue. For this reason, the listed stock exchanges are in a precarious position.

The vast majority of high-frequency trading is confined to large- and mid-capped stocks. It is for this reason that we think it should be easy for Congress, the SEC, stock exchanges, investment banks and perhaps even the high-frequency trading community to reach an accommodation in the small-cap segment. As mentioned in a previous section, while this sub-\$2 billion public company sector represents over 80% of public companies, it comprises less than 7% of total market value. This was the rationale behind *The Wall Street Journal* op-ed published on October 27, 2011, titled “How to Revive Small-Cap IPOs: A new, parallel market can provide the critical support companies under \$2 billion in value need to go public.”⁴²

One concern expressed by entrepreneurs about listing their company on a newly formed stock market is the fear of being stigmatized if they choose a new, unbranded market. For this reason, any new market would be better accepted under the umbrella of one of the major listed brands (e.g., NYSE or NASDAQ) than it would if it were to go it alone. Alternatively, if all companies were given a choice over their own tick sizes (or an algorithmic way of determining optimal tick sizes was instituted), there would be no risk of “stigma,” and there could be one market with one regime of mass customization.

⁴² online.wsj.com/article/SB10001424052970203554104577001522344390902.html.

Beware of the hidden agendas of those who champion smaller tick sizes

As a result of our past studies (e.g., *Why are IPOs in the ICU? A wake-up call for America, Market structure is causing the IPO crisis — and more*), we are continually engaged in discussions with current and former regulators, securities attorneys, politicians, economists and industry executives. We have learned much from these discussions, including that there may be hidden agendas for pushing for smaller tick sizes when it seems that the evidence is in: small tick sizes, applied to all stocks, are undermining U.S. markets and with them, capital formation, job growth and the U.S. economy.

The following is a list of arguments and hidden agendas that may help to explain why some people will argue that smaller tick sizes enhance liquidity for small-cap stocks (the stock market version of “black is white”):

- **To eliminate sales:** Smaller tick sizes eliminate the incentive for stockbrokers to market stocks to investors. By eliminating sales incentives, some hope to eliminate sales practice abuses.
The hidden agenda: To eliminate sales practice abuses (we believe, however, that vigilant enforcement is the proper way to address these abuses).
- **To eliminate small public companies:** Smaller tick sizes make it difficult for small companies to go public. Because small companies fail at higher rates than large companies, investors are protected from these failures.
The hidden agenda: To keep small companies from going public.
- **To be right:** Some market participants are likely to resist admitting that well-intended market structure changes such as the Order Handling Rules in 1997, Regulation ATS in 1998 and Decimalization in 2001 might have had a catastrophic impact on the U.S. economy.

The hidden agenda: No one likes to admit that he or she was wrong. It takes courage to stand up and correct past mistakes. However, we are hopeful that those who are in a position to advocate for these rule changes will follow the example of some, including former chairman and CEO of Citigroup Sandy Weill (on the repeal of Glass-Steagall) and former SEC Chairman Arthur Levitt (on the unintended consequences of the Order Handling Rules), and begin the process of bringing our IPO market back to its former level — one that made the United States the envy of stock markets throughout the world.

- **To serve special interests:** Many market participants benefit from smaller tick sizes, which proliferate the number of price points in which stocks trade, thereby increasing trading complexity and large-cap volume, and increasing their potential to profit even at the expense of the economy.
The hidden agenda: Special interests lobby to change market structure in ways that will increase their profits.
- **To “protect” consumers:** Some market participants blindly support the merits of low-cost trading, not appreciating the harm that is actually inflicted upon investors. The march toward ever-lower costs has, in fact, deprived the markets of adequate economic incentives to support capital formation and economic growth. This, in turn, undermines consumers by eroding investment returns, job growth and tax revenues required to sustain public services (e.g., education, sanitation, and fire and police protection).

The good news is that more and more people are coming around to the view that small tick sizes are making a wasting asset of the U.S. stock markets.

We believe that it is only a matter of time before reason prevails and market structure enhancements are implemented to reverse the more than decade-long decline in primary capital formation.

Tick sizes: The academic perspective and international practices

Academic approaches offer hints, but fall short

Micromarket economists tend to focus on changes in liquidity (or other metrics) around specific events over relatively short, measurable time frames. Yet, as **Professor Robert Schwartz**⁴³ pointed out at his annual Financial Markets Conference in New York:

“Markets are still adjusting to regulatory changes like the Order Handling Rules and Regulation ATS that were made over a decade ago.”

While most of the public sees the stock market as simply the NYSE and NASDAQ, in fact, the stock market is defined by the totality of market participants — brokerage firms, institutional and retail investors, large and small investment banks, sell- and buy-side research analysts, traders and trading venues — without which markets cannot function. This is what we refer to as the stock market ecosystem, and we believe that only from an examination of the long-term decline in the ecosystem, coupled with a qualitative analysis of how short-term measurable effects from micromarket structure changes could have led to this decline, can legislators and regulators fully understand how the proliferation of ticks (decrease in tick sizes) could have eroded primary capital formation, economic growth and job formation.

In the 1980s and 1990s, it was generally accepted and appreciated by stock exchange officials at NASDAQ and the NYSE that large-cap stocks would subsidize the research, sales and trading support required by smaller-cap stocks in the interests of capital formation and economic growth.⁴⁴ In fact, the NYSE went as far as to allocate small-cap stocks to the specialist booths of firms making markets in large-cap stocks. The quid pro quo for permitting these specialist firms to earn excess profits on large-cap stocks was the expectation that they would subsidize small-cap stocks. It was also understood that large-cap stocks and higher spreads would create flows to broker-dealers that would allow them to carry the standing infrastructure of salespeople, research analysts and traders needed to subsidize small-cap liquidity between “IPO windows.” Thus, the cash equities business was seen as a break-even business until the IPO window would open and generate profits and bonuses for Wall Street personnel.

The higher profits derived from higher tick sizes and bankable spreads created a profit opportunity that incentivized Wall Street firms to maintain larger sales forces that would cover more institutional and retail investors. This larger sales and marketing capability supported volumes of high-touch sales calls to a broad range of investors that educated investors and created recognition, appreciation and a market for less well-known stocks.

So, what happened? We believe that the NYSE had a viable model in the form of large-cap stocks subsidizing small-cap liquidity, and NASDAQ had a viable model in the form of large tick sizes and trading spreads enjoyed by the dealer community that enabled enough profitable aftermarket trading for dealers to cause them to steer IPOs in NASDAQ’s direction. The AMEX, however, did not have a viable model to adequately subsidize and support small-cap companies in the aftermarket.

⁴³ Baruch College’s Marvin M. Speiser Professor of Finance and University Distinguished Professor of Finance at the Zicklin School of Business.

⁴⁴ Conversations, over the past two years, between David Weild and Richard Grasso, former chairman and CEO of the NYSE, and Richard Bernard, former general counsel for the NYSE and a member of the International Stock Exchange Executives Emeriti (ISEEE).

Today, in the wake of decreasing tick sizes, these subsidies have been eliminated, which has caused a wholesale decline in this standing infrastructure. The decline in the IPO market is directly attributable to the decline in the standing infrastructure including sales, research, capital commitments and smaller investment banks.

Section 106(b) of the JOBS Act asks a long-term question: How did the “transition to trading and quoting securities in one-penny increments, also known as decimalization...impact... the number of initial public offerings since its implementation relative to the period before its implementation?” A firm answer to this question appears to be beyond the purview of micromarket economics, which seems focused on analyzing the impact of a structural change to market structure over short periods of time on stock trading, and not considering the cumulative effect of multiple changes on the broader stock market ecosystem that include a wide variety of changing participants from research analysts and salespeople to traders.

We liken the increasing recognition that the proliferation of ticks undermines markets broadly to the revelation that tobacco, which for hundreds of years was thought to be a cure-all,⁴⁵ causes cancer.

Inconclusive benefits and unintended consequences

Academic research conducted on the impact of tick size reductions on different global markets has generally concluded that large companies — which tend to be very liquid, have recognized brand names and trade at higher prices — are helped by decreases in tick sizes. Tick size reductions for these types of companies have improved their market quality by tightening spreads and attracting new market participants, therefore benefiting investors by lowering transaction costs and increasing the number of liquidity providers.⁴⁶

These benefits diminish or disappear altogether, however, for smaller, less-liquid companies. Decreased tick sizes and spreads have decimated return potential and increased risk exposure for market makers, which now lack economic incentives to support these small-cap stocks and have generally reacted by cutting the resources that once supplied this support.

While continually decreasing tick sizes has arguably benefited large-cap investors in the short-term — due to improved bid-ask spreads at the expense of small-cap companies and market makers — its overall impact on capital formation and economic health is largely unstudied and therefore, unknown. There is also significant debate regarding what constitutes the optimal tick size that will benefit all market participants, with academic research suggesting that it is improbable that an ever-diminishing, one-size-fits-all approach will be beneficial to companies of all sizes. If tick sizes continue to decrease, the technological demands on the trading infrastructures and data systems of all markets will continue to proliferate as the number of quotable increments expands exponentially, trading becomes riskier and complexity intensifies — all at no gain to investors or public companies, and possibly to the detriment of the global economy.

⁴⁵ academic.udayton.edu/health/syllabi/tobacco/history.htm#begin.

⁴⁶ This finding is repudiated by other academic studies, however, that find that new market participants in the form of unconstrained high-frequency, algorithmic traders actually decrease liquidity and increase trading costs and stock price volatility.

Variations in international tick size rules

Broadly speaking, worldwide tick size standards are classified as either static or dynamic. A static tick size regimen is based on a single fixed value that applies to all quotes in a security, regardless of its stock price, market float or any other size or liquidity measurement. The United States is one example of a static regimen.

In contrast, a dynamic tick size schedule allows the price increment to vary by moving it up or down along a sliding scale depending on a range of values — typically price per share, as it is easily measured. As market participants enter quotes into an order book, each price is assessed against an approved tick size matrix to determine the appropriate increment. Countries that employ dynamic tick size regimens have overwhelmingly chosen to base them solely as a function of a share price's variation, which, like static regimens, fails to adequately account for a company's market float, liquidity and trading volume, among other characteristics. Effective tick size regimens should optimally be customized to the characteristics of each public company, and computer technology is now at the point where mass customization of tick sizes could be cost-effectively achieved.

Whether countries choose to employ static or dynamic tick size standards, the relative tick size⁴⁷ under both regimens is now almost always universally small — typically occurring between five and 10 basis points,⁴⁸ regardless of a company's share price (see Appendix C: Tick size standards around the world, page 52).

⁴⁷ Based on tick size as a percentage of price per share.

⁴⁸ Based on the minimum and maximum relative tick size statistical mode.

The race to the bottom

Despite a recognized need to harmonize tick size standards across trading venues, competitive pressures have led most global stock markets to carry out significant decreases in tick sizes in recent years. Plagued by a proliferation of entrants, including alternative trading platforms and market participants employing ultrafast algorithmic trading practices, many exchanges have been forced to add granularity and reduce their pricing grids in order to defend their territory (and profits).

While all of this activity may improve an exchange's competitive position by driving increased trading volume, the academic research seems to suggest that it is happening at the detriment of other market participants, most notably small, less-liquid companies.

The literature shows that smaller tick sizes hurt liquidity for illiquid stocks:

- Illiquid stocks are harmed by smaller tick sizes.
- Liquid stocks are helped by smaller tick sizes.

But, not so fast! What are the long-term effects of smaller tick sizes on the ecosystem?

Answer: They degrade stock market infrastructure and capital formation, and undermine the economy.

Recommendations and conclusions

“**Larry Tabb, chief executive of the Tabb Group**, said dime spreads shouldn’t be off the table and [should be] considered as well. This, he added, would incentivize brokers to trade and provide research for smaller and new companies.

“**[Professor James] Angel** believes issuers, not the regulators, should decide what the spread should be in stocks. But if a company trades better with sub-penny pricing, ‘then sub-penny should be permitted.’”

“Wider Spreads and Fees Could Help Restore Investor Confidence”
John D’Antona Jr.
Traders Magazine Online News
June 1, 2012

The JOBS Act, Part 2 (issuer choice) — make stock markets work for issuers (employers) again

SEC-driven regulatory changes beginning back in 1996 ushered in an age of intense competition and innovation for investor (and trader) order flow in public equities. However, as a result of Regulation NMS, which permitted all trading venues to compete for trading in all listed securities, issuers were deprived of their only choice in market structure as it impacted their shares, i.e., the dealer versus specialist system. Today, it does not matter whether issuers list on the NYSE, NASDAQ or the NYSE AMEX (and in the future, BATS and Direct Edge), because they have no control over how their stock is traded and, in turn, no ability to significantly influence the level of:

- speculative versus investment activity,
- research coverage,
- sales support, or
- capital commitment.

We propose a very simple change to empower the boards of directors of public companies to optimize the market for their shares by giving them the authority to establish the tick size in the trading of their stock by a simple majority vote of their board of directors.

The current penny-or-less tick size has created near-frictionless trading that induces speculative trading in large-cap stocks and removes the economic incentive for traders to provide liquidity, and for research analysts and brokers to create order flow in small- and micro-cap stocks.

If issuers of all market value sizes were able to choose a tick size from a range that is no less than one penny and no more than 5% of their share price, they would be able to customize their tick size in a way that they determined was in the best interests of the market for their shares.⁴⁹ This would allow issuers to optimize their access to capital, support and volatility by:

- providing adequate incentives for equity research coverage,
- providing adequate incentives for capital commitment and market making,
- encouraging investment activity, and
- discouraging speculative activity.

⁴⁹ The SEC will also need to control rebates and executions within the spread in order to keep volume from migrating to dark pools and to prevent siphoning off of revenue intended to fund the value components of research, sales support and capital commitment.

A healthy discussion would be entered into by the issuer, investment banks, market makers and investors to determine what the optimal market structure, as defined by tick size, might be — is it 1 cent, 5 cents, 10 cents, 20 cents, \$1 or something else?

“Issuer choice” tick size implementation table

Stock price per share	Tick size range	Relative tick size range*
< 1.00	0.0001 to 0.049995	0.01% to 5%
1.00 to 4.99	0.01 to 0.2495	0.2% to 5%
5.00 to 9.99	0.01 to 0.4995	0.1% to 5%
10.00 to 49.99	0.01 to 2.4995	0.02% to 5%
50.00 to 99.99	0.01 to 4.9995	0.01% to 5%
≥ 100.00	≥ 0.01	≤ 5%

*Tick size as a percentage of price per share.

Sources: Grant Thornton LLP and Capital Markets Advisory Partners LLC.

Alternatively, policymakers could automate the mass customization of tick sizes via an algorithm that establishes increments at one-half of the average quoted spread of a stock over some defined period of time, e.g., trailing 12 months. Stock exchanges increasingly acknowledge that today’s market structure is effective only for a small minority of innately liquid, mostly large-cap stocks, and that higher-priced and less-liquid stocks could benefit from higher tick sizes, while lower-priced and extremely liquid stocks could benefit from smaller tick sizes.

For example, a stock that trades with a quoted spread of 20 cents might have a tick size of 10 cents (two increments within the natural spread). For a stock whose quoted spread is 1 cent per share, the tick size might be one-half of 1 cent (two sub-penny increments). The division in two of natural spreads is based on history. In the early 1990s, when quote spreads were generally 25 cents per share, most stocks traded in tick sizes of 12.5 cents. There were two ticks within the quoted spread, and capital formation for small businesses thrived. Academics

have generally reported that small-cap stocks have not generally experienced a decrease in spreads, so a two-tick increment may best simulate the market-making incentives of the early 1990s, when small company capital formation thrived. However, further study may be needed to determine the optimal number of ticks. Trading-oriented entities should argue for smaller tick sizes (more ticks) and investment-oriented entities should argue for larger tick sizes (fewer ticks) including only one tick equivalent to the natural quoted spread. The NYSE, NASDAQ and BATS have jointly petitioned the SEC to request smaller ticks in very liquid, low-priced companies. Market participants have suggested that the logical extension of this request would be allowing larger tick sizes for illiquid and/or high-priced stocks.

These two recommended alternative solutions may be used individually or in combination. In the instance where the issuer choice alternative is used, for issuers that have not affirmatively made a choice in tick size, there might be a default option. That default option could be fulfilled by algorithmic customization of the issuer’s tick size.

Congress can require the SEC to implement such systems across all trading venues, or the SEC could simply enact its own rule. Because these changes necessitate only a simple programming change, these capabilities could be implemented very quickly and cost-effectively by all trading venues. The SEC could appoint a central administrator (e.g., the SEC, the DTCC or FINRA) of tick sizes, which would then be published to the market. These improvements in market structure would also allow the retention of current major trading regulations including the Manning Rule, the Order Handling Rules, Regulation ATS and Regulation NMS.

When tick sizes are increased, the SEC and Congress must ensure that:

- trading cannot be moved offshore to quote within the tick size and, therefore, doing offshore what you cannot do in the United States; and
- rebates and other sharing arrangements do not make a mockery of the incentives intended by increases in tick sizes.

We prefer, for market confidence reasons, a simple structure where everyone — institutional and retail — pays the same tick increment.

Broad benefits

We believe there would be broad benefits for the U.S. economy because an issuer-selected tick size regimen would:

- be supportive of job creators (issuers) by giving them a voice and a seat at the table;
- be likely to induce growth in the ecosystem to support small companies, IPOs, investments and job growth;
- be simple to implement;
- be highly cost-effective;
- usher in a healthy discussion among issuers, investment banks, research analysts and investors as to what constitutes an optimal market structure for different types of public companies;
- create choice for issuers and investors;

- dampen volatility; and
- promote investment activity over speculative activity.

Trial and implementation

The JOBS Act requirement for the SEC to study the impact of decimalization on U.S. capital markets is an important first step in opening the dialogue regarding small company market structure concerns.

We urge the SEC to also consider how public companies of all sizes would benefit from higher tick sizes, which will:

- expand research, sales and trading support;
- raise the visibility of less-liquid companies, thereby expanding investors’ pool of opportunities;
- favor investors and stock pickers over short-term traders and indexers; and
- increase investor confidence by reducing the number of price points at which stocks are traded and by limiting computer trading behaviors.

Larger tick sizes will improve investor confidence, capital formation and job growth		
	Large-cap stocks (naturally liquid)	Small- and micro-cap stocks (naturally illiquid)
Smaller tick sizes	<ul style="list-style-type: none"> • Cut order depth • Increase liquidity • Increase stepping ahead/gaming • Increase quote flickering • Undermine investor confidence 	<ul style="list-style-type: none"> • Decrease order depth • Decrease (hurt) liquidity • Increase stepping ahead/gaming • Discourage marketing (sales) support • Discourage active research support • Discourage capital commitment • Undermine investor confidence
Larger tick sizes	<ul style="list-style-type: none"> • Increase order depth • Decrease liquidity (but stocks are still extremely liquid) • Limit stepping ahead/gaming • Decrease quote flickering • Improve investor confidence (market seems more transparent) 	<ul style="list-style-type: none"> • Increase order depth • Increase liquidity • Discourage stepping ahead/gaming • Encourage marketing (sales) support • Encourage active research support • Incentivize capital commitment • Improve investor confidence

Sources: Grant Thornton LLP and Capital Markets Advisory Partners LLC.

The SEC should initiate a pilot program to let companies of all sizes choose their own tick size, following parameters determined by the SEC. This program would examine larger tick sizes in a significant (hundreds) and representative (share price, volume, market value, etc.) sample of stocks. Managements and their boards must become engaged in the market structure debate so that they can understand the linkage between market structure and its impact on their shareholders. What better way to do this than to give issuers control over their own tick size?

During the pilot program, the SEC would also be able to gather valuable research and data to inform the debate on how to best structure the U.S. capital markets to support capital formation and job growth. The SEC could then evaluate the impact of different tick sizes on 1) the pricing and trading patterns of companies with different liquidity profiles, and 2) how these patterns vary across specific industries and company sizes.

It must be acknowledged that while a pilot program would generate valuable data on the impact on short-term liquidity in these stocks, it will not enable the SEC to gauge the magnitude of commitments that Wall Street might make if it were certain that the size and scope of tick size increases would be made permanent. For example, Wall Street cannot be expected to hire permanent equity research analysts, institutional salespeople or sales traders (capital committers) in response to merely a pilot program. If this proposal is implemented and eventually expanded to the entire marketplace, the SEC may want to examine the magnitude of new investments in research, sales, trading and capital committed after a two- or three-year period. The authors believe that these commitments would be significant.

These, among other areas of study, would build upon the JOBS Act and help define optimum tick sizes to keep costs low for investors and attract the necessary infrastructure support. Market forces would then become the determinant of tick sizes, rather than the arbitrary ruling of one-size-fits-all sub-penny increments. The fallacy of “What is good for Exxon Mobil is

good for issuers of all sizes” — which has served as a foundation for far-reaching and destructive rulemaking — has clearly failed the U.S. economy.

Create an Issuer (Job Creators) Bill of Rights

It is clear that market structure has become increasingly hostile to issuers. Issuers complain that stocks are increasingly correlated and do not appear to trade on their fundamentals; stock market volatility has increased; management is required to dedicate an increasing and sometimes alarming percentage of time to investor relations (IR); and who trades (long and short) in its securities is so opaque management is prevented from being able to prioritize and allocate its time effectively.

We believe it is essential for issuers and their advocates to have a voice in this debate. The following “Issuer Bill of Rights” was compiled from a group of panelists at the annual National Investor Relations Institute conference on June 4, 2012, in Seattle, Wash., and overwhelmingly approved in a show of hands by more than 200 mostly IR professionals representing large and small public companies. The panel, titled “IR Targeting & Investor Trading Behaviors,” was moderated by Tony Takazawa, vice president of global investor relations at EMC Corporation. Panelists included Jason Lenzo, director of equities and fixed income trading at Russell Investments; Tim Quast, managing director at ModernIR; and David Weild, co-author of this study. Each of the five points was separately voted on and approved by the audience:

We call on the SEC and Congress to provide issuers (job creators) with:

1. **Equal standing:** Issuers must have equal input to the trade execution community on market structure.
2. **Representation:** A standing issuer advisory council to the SEC made up of issuers and issuer advocates.
3. **Transparency, timeliness and completeness:** Issuers deserve real-time trading and ownership data of all long and short activity.
4. **Choice in market structure:** No more one-size-fits-all market structures.
5. **Market structures that encourage fundamental investment strategies over trading strategies.**

Appendix A

Proposed preliminary draft legislation: The JOBS Act, Part 2

The authors would like to thank Adele Hogan for providing the content in this appendix.

[Suggested proposed preliminary draft for discussion purposes only]

___ TH CONGRESS
___ SESSION

Calendar No.

H.R. _____

IN THE SENATE OF THE UNITED STATES

_____, 201_

Received; read the first time

_____, 201_

Read the second time and placed on the calendar

AN ACT

To amend the Securities and Exchange Act of 1934 (the “1934 Act”) to require the Securities and Exchange Commission (“SEC”) to implement a plan to test whether each publicly listed company (a “Public Company”) under Sections 12 (b) or 12(g) of the 1934 Act should be allowed to choose to have an increased trading spread associated with its equity securities for a set period of time (“Customized Trading Spreads”) if such company’s board of directors deems Customized Trading Spreads to be desirable in order (i) to attract research coverage and broker support to the Public Company, (ii) to attract market making to the Public Company, (iii) to support capital-raising for the Public Company, (iv) to increase the stability of the shareholder base and lessen volatility in the share price of the Public Company or (v) to be otherwise in the best interests of the Public Company and its long-term investors.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited and referred to as the “Customized Trading Spreads for a Stronger Capital Market and to Foster Business and Job Growth of 201_.”

SECTION. 2. CUSTOMIZED SPREADS

(a) IN GENERAL — Section 11A of the 1934 Act is amended

- (a) (1) by striking the “and” in subparagraph (a)(1)(C)(iv), by replacing the period at the end of a subparagraph with a semicolon and by adding an “and” at the end of subparagraph (a)(1)(C)(v)
- (a) (2) by inserting the following after subparagraph (a)(1)(C)(v):

(a)(1)(C) “(vi). a mechanism for protecting investors from market conditions that, due to the unforeseen consequences of regulation, may artificially and unintentionally favor one type or size of company over another in the capital formation process, thereby limiting the investment and growth opportunities (including the ability to hire additional employees) of some companies whose equity securities may be or are held by investors by ensuring that a company registered or to be registered under Sections 13(d) or 13(g) of the 1934 Act (a “Public Company”) may choose Customized Trading Spreads within certain parameters to be established from time to time by the SEC.”

- (a) (3) by inserting a new paragraph at the end of subsection 1(a)(1)(E) –

“In consideration of the aforementioned protection of investors, the SEC shall be directed to involve the investing public, Public Companies, clearing and depository organizations, exchanges (including the New York Stock Exchange (“NYSE”) and NASDAQ), the Financial Regulatory Association (“FINRA”), member firms and other market participants as the SEC may deem appropriate (the “Participants”) in developing and implementing a plan allowing the boards of directors of companies to select for a fixed period, or periods of time to be determined, customized trading spreads, perhaps of \$0.02, \$0.03, \$0.05, \$0.10, \$0.15 or \$0.25 per share, but not to exceed 5% of share price and as ultimately approved by the SEC (the “Plan”), and the Plan shall consist of implementation phases for the purpose of maximizing the benefits and checkpoints to make any appropriate changes to minimize or avoid any unintended consequences related to the Plan;

a) During the phase-in period, the SEC shall set a minimum number of Public Companies based on criteria it deems appropriate taking into consideration the recommendations from the Participants, to participate in the Plan;

b) The phase-in period shall be as set by the SEC based on input from the Participants, but may take the form of something like the following:

i) Phase I — An evaluation of pricing and trading patterns by the Participants during which a minimum of 100 equity issues listed on each of at least the NYSE and NASDAQ will quote using the Customized Trading Spreads in the manner outlined in the Plan;

ii) Phase II

- (a) approximately 500 exchange-listed equity issues will quote, and the Participants and the SEC will continue to evaluate the transition to Customized Trading Spreads and the Plan's impact on the markets and the industry, especially as the transition and the Plan relate to capacity, liquidity, research and trading patterns;
 - (b) Participants and the SEC will evaluate the results of the first two phases and determine if they are technically prepared for broader implementation, and what adjustments, if any, might be appropriate;
 - iii) Phase III — After determining the Plan's readiness for all markets, the Participants will recommend a full implementation of customized trading spreads (considering it would cause no adverse impacts to the investing public other than an increase in trade execution costs), and will continue to evaluate the results of previous phases and the industry's transition;
- c) Participants may work separately or jointly with each other and the SEC, and commission a third party or parties to perform a detailed statistical analysis of quoting and trading activity beginning with Phase I and extending through the Phase-In Period.
- d) Fallback and recovery — Participants will require specific procedures for Participant fallback.
- i) There may be an after close-of-market fallback to \$0.01 (penny) pricing as a last resort after all other efforts have been exhausted for equity quoting for the phases;
 - ii) If a Participant chooses to revert from Customized Trading Spreads back to \$0.01 quoting, all exchanges quoting the applicable securities must agree to fallback as well;
 - iii) If a clearing or settlement entity cannot process the first day's trading activity, the Participants trading the issues cleared or settled will open with the applicable Customized Trading Spreads on the following business day;
 - iv) Each Participant will submit its own procedures on how to deal with open orders on issues quoted in the Customized Trading Spreads format and the circumstances under which they will revert back to \$0.01 pricing, subject to approval from time to time by the SEC.

Appendix B

Proposed preliminary phase-in implementation plan

The authors would like to thank Adele Hogan for providing the content in this appendix.

[Suggested proposed preliminary draft for discussion purposes only]

Commission notice:

Implementation plan for companies to choose if they want to designate their equity securities to have an increased trading fee associated with them (customized spreads) in the equities and options markets

Exchange committee on customized, stepped-up trading prices/spreads

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Section I — Introduction

On [_____, 201_], the Securities and Exchange Commission (“Commission”) proposed for comment a plan to provide certain companies registered under Section 12(g) of the Securities and Exchange Act of 1934 (“Listed Companies”) with the option to choose Customized Trading Spreads related to their equity securities. In order for the U.S. equities markets to once again be a stronger vehicle for companies to raise capital and thereby create economic growth and job opportunities, Congress has directed the Commission to develop a plan to allow Listed Companies’ boards of directors to select an optional step-up in trading prices for equity securities (“Customized Trading Spreads”). Congress has directed the Commission to increase the ability of Listed Companies and companies that wish to become Listed Companies to access the U.S. securities markets and to provide more shareholder base stability. This proposal is intended to increase funding and shareholder stability for Listed Companies, which would allow them to create jobs and develop new products and services, while at the same time allowing more investors to participate in the growth opportunities of a wider range of companies with different sizes of market capitalization.

When Regulation NMS and the Order Handling Rules were implemented in 2005 and 1997, respectively, the ability of companies with under \$100 million of potential market capitalization to do an initial public offering (“IPO”) of listed required equity securities dropped off precipitously and has not recovered. The U.S.-registered securities market dropped from the most popular market in the world to the sixth-most popular for new IPOs of that size. The Commission understands Congress’ concern that investors should have the opportunity to invest in mid-size and small companies, particularly since many of these companies formerly did relatively small IPOs that probably could not take place in today’s market structure. Those small and mid-sized companies obtained funding and grew to be some of the largest and most prominent companies in the U.S. today, collectively employing hundreds of thousands of people, including such prominent companies as Apple, Intel and Microsoft.

On [_____, 201_], the Commission ordered the NYSE Euronext (“NYSE”), the Chicago Board Options Exchange Inc. (“CBOE”), NASDAQ Capital Market (“NASDAQ”), the Financial Industry Regulatory Authority (“FINRA”) and others (“Participants”) to act jointly in discussing, developing and submitting to the Commission a plan to implement (“Implementation Plan”) Customized Trading Spreads at a public company’s option for specified periods of time in the equities and options markets, beginning no later than [_____, 201_], and in implementing the Implementation Plan.

As mandated by the Commission order, this plan has been discussed with interested market participants, including the Securities Industry and Financial Markets Association (“SIFMA”) and its members; the Depository Trust & Clearing Corporation (“DTCC”) and its two operating subsidiaries, the National Securities Clearing Corporation (“NSCC”) and the Depository Trust Company (“DTC”); the Options Clearing Corporation (“OCC”); the Securities Industry Automation Corporation (“SIAC”); the Intermarket Trading System Operating Committee (“ITSOC”); the Options Price Reporting Authority (“OPRA”); the Consolidated Tape Association (“CTA”); and the Consolidated Quote Operating Committee (“CQOC”) (“Interested Parties”). The Participants submitted to the Commission a plan for a phased-in implementation of the Implementation Plan. The purpose of the phase-in period is to have an orderly implementation with an opportunity to confirm that there are no unintended consequences of the Implementation Plan. The checkpoint phases thereafter are intended to analyze how the phasing periods work.

Section II — Background

In mid-1997, in recognition of the potential benefits to the investing public of Customized Trading Spreads for equity securities, the Commission urged Participants to work on the Implementation Plan. SIFMA and the equities and options markets formed a Customized Trading Spread Committee in [_____, 201_] to develop a Customized Trading Spread implementation plan and coordinate a smooth transition.

Section III — Implementation strategy

The Participants recommend a phased-in implementation, consisting of three phases, for the conversion to the new choice of Customized Trading Spreads that reduces the risk to the investing public, issuers, Participants, clearing and depository organizations, and member firms. This implementation period (“Phase-In Period”) will begin on [_____] and will end with full implementation for all equities and options on or before [_____].

The Participants believe a phased-in implementation is the most effective way to ensure that markets continue to operate in an efficient, orderly and fair manner, while mitigating the risk of fallback, and allows Participants to determine the impact of Customized Trading Spreads on trading rules and the intermarket system’s capacity during historically high-volume times (e.g., option expirations, triple witching).

In order to mitigate the risk to the investing public of trading and quoting message rates that could possibly overwhelm industry capacity, thereby producing stale information, the Participants recommend that during the Phase-In Period, a minimum participation in the number of companies and a set schedule of pricing choices for quoting should be applied and continued through the last day that this Implementation Plan is in effect.

The recommended pricing choices schedule from which companies may choose for quoting in their equity securities is as follows:
For equity issues (not to exceed 5% of share price): \$0.01 pricing choice, \$0.03 pricing choice, \$0.05 pricing choice, \$0.10 pricing choice and \$0.25 pricing choice
For option issues quoted under \$3 a contract: \$0.05 pricing choice
For option issues quoted at \$3 a contract and greater: \$0.10 pricing choice

The Participants agree to abide by the schedule above while the Implementation Plan is in effect.

The Participants may work separately and/or jointly, and may commission a third party or parties to perform a detailed statistical analysis of quoting and trading activity beginning with Phase I (limited exchange-listed issues) and extending through the Phase-In Period. For Phase I and Phase IIA (additional exchange-listed issues), the Participants will agree on the equity issues (and options on those equities). The result of the study or studies will form the basis for the Participants’ study or studies on systems’ capacity, liquidity and trading behavior, which is due to the Commission no more than 60 days after full implementation, (on or before [____]) of the new choices of Customized Trading Spread pricing.

Importantly, at the end of the Phase-In Period, the price choices described above will remain in effect through the last day that this plan is in effect — until the Commission approves rules for each Participant that designate the minimum increment by which equities and options are quoted, or until any other date identified by the Commission. The Participants’ implementation project schedule and milestones can be found in Appendix A.

Section IV — Testing and readiness reporting

The Participants have discussed their readiness at each of the Exchange Committee meetings during the plan preparation. After the plan is submitted to the Commission, the Participants, in conjunction with the Interested Parties, will discuss readiness prior to the checkpoints listed in this plan. The schedule for the Participants' meetings during plan preparation is as follows:

[_____, 201_]
[_____, 201_]
[_____, 201_]

In addition to the Exchange Committee meetings, Participants report on their status and firm testing status at the biweekly SIFMA Testing and Implementation Subcommittee meetings and the monthly SIFMA Steering Committee meetings. The schedule for these meetings, prior to Phase I implementation, is as follows:

[_____, 201_]
[_____, 201_]

The equity issues (and options on those equities) that will quote in the higher amounts for Phase I that have been identified and widely disseminated. The equity issues (and options on those equities) that will quote for Phase IIA will be identified by the end of [_____, 201_] and by the beginning of [_____, 201_], respectively. These time frames meet the approximate two-months' notice that the member firms have identified to SIFMA that they need in order to inform their customers. The Participants and SIFMA will ensure dissemination to their respective membership bases through the use of websites, membership bulletins and the SIFMA committees.

Section V — Implementation phases

A. Phase I — Limited exchange-listed issues

The Participants recommend that the Phase-In Period consist of an initial phase, to begin on [_____, 201_] and continue through the last day that this plan is in effect, during which a minimum of 10 to 15 exchange-listed equity issues listed on each of at least the NYSE and NASDAQ (and options on those equities) will quote (per the recommended quote price choice schedule documented earlier) and where the Participants, with the cooperation of the Interested Parties, will evaluate the industry's transition. Due to the concerns of the industry and the Participants regarding the impact of the new pricing on message traffic and trading patterns, an evaluation of pricing by the Participants will commence beginning with this phase.

B. Phase IIA — Additional exchange-listed issues

Participants recommend that Phase I be followed by a partial conversion (per the recommended quote price choice schedule documented earlier) of approximately 50 to 100 exchange-listed equity issues (and options on those equities) beginning on [_____, 201_] and continuing through the last day that this plan is in effect. The Participants and the Interested Parties will continue to evaluate the transition to the new choice of Customized Trading Spreads and its impacts on the industry, especially as they relate to capacity, liquidity and trading patterns.

C. Phase IIB — Full conversion of exchange-listed issues and/or all options checkpoint

At Checkpoint III (determine readiness for full implementation of exchange-listed issues and/or all options), the Participants will evaluate the results of the first two phases of the new choice of Customized Trading Spread quoting. If, after consultation with the Interested Parties and the Commission, the Participants believe that the Participants and Interested Parties are technically prepared for full implementation, and this would not cause adverse impacts to the investing public, the Participants may elect to fully convert all exchange-listed issues and/or all option issues to the new choice of Customized Trading Spread quoting (per the recommended quote price choice schedule documented earlier). Any decision to fully convert exchange-listed issues and/or all options will be made during the period between [_____, 201_] and [_____, 201_], and a notice will be widely disseminated by the Participants and the SIFMA to the industry and the investing public at least 30 calendar days before implementation.

D. Phase III — All markets, full implementation

At Checkpoint IV (determine readiness for all markets, full implementation), the Participants will evaluate the results of all previous phases. If, after consultation with the Interested Parties and the Commission, the Participants believe that the Participants and the Interested Parties are technically prepared for full implementation, and this would not have an adverse impact on the investing public, the Participants recommend that full implementation of the new choice of Customized Trading Spreads quoting for equities and options (per the recommended quote price choice schedule documented earlier) begin on or before [_____, 201_] and continue through the last day that this plan is in effect. The Participants, with the cooperation of the Interested Parties, will evaluate the industry's transition to full implementation of the new choice of Customized Trading Spreads in all issues, and joint and/or independent studies will continue evaluating the impacts of the new choice of Customized Trading Spreads pricing.

E. Checkpoints

The Participants have identified five checkpoints where the Participants will formally evaluate the results of the phase-in implementation program and determine the industry's ability to function without disruption to the investing public in a new choice of Customized Trading Spreads environment. Throughout the period during which this plan is effective, however, the Participants will monitor the impact of the new choice of Customized Trading Spreads on the industry and will confer with the Commission on those impacts.

1. Checkpoint I — Pre-implementation evaluation

The first checkpoint will take place on [_____, 201_], when the Participants will poll the Interested Parties, review industry-mandated test results and confer with the Commission on the industry's preparedness to proceed with Phase I on [_____, 201_]. While the Participants have defined fallback scenarios for themselves during this phase (see Section VI — Fallback/recovery) and have determined that no single firm failure will cause a fallback to fractional pricing, the Participants will be prepared to confer with the Commission if it appears that multiple failures are placing the investing public at risk or at a disadvantage. The Participants have identified the equity issues (and options on those issues) to be quoted in the new choice of Customized Trading Spreads in Phase 1.

2. Checkpoint II — Determine readiness for additional exchange-listed issues

The second checkpoint will take place on [_____, 201_], when the Participants, after polling the Interested Parties, will confer with the Commission on the industry's preparedness to proceed with Phase IIA of the Phase-In Period on [_____, 201_]. While the Participants have defined fallback scenarios for themselves during this phase (see Section VI — Fallback/recovery) and have determined that no single firm failure will cause a fallback to fractional pricing, the Participants will be prepared to confer with the Commission if it appears that multiple failures are placing the investing public at risk or at a disadvantage. By the end of [_____, 201_], the Participants will identify the additional equity issues (and options on those equities) to be quoted in the new choice of Customized Trading Spreads in the second phase.

3. Checkpoint III — Determine readiness for full implementation of exchange-listed issues and/or all options

The third checkpoint will occur on [_____, 201_]. The Participants will evaluate the results of the first two phases of the new choice of Customized Trading Spreads quoting. If, after consultation with the Interested Parties and the Commission, the Participants believe that the Participants and the Interested Parties are technically prepared for full implementation and this would not have an adverse impact on the investing public, the Participants may elect to fully convert all exchange-listed issues and/or all option issues to the new choice of Customized Trading Spreads quoting (per the recommended schedule documented earlier). The Participants may also elect to implement a penny pilot in selected option issues. Any decision to fully convert exchange-listed issues and/or all options or to implement a penny pilot on options will be made during the period between [_____, 201_] and [_____, 201_], and a notice will be widely disseminated by the Participants and the SIFMA to the industry and the investing public at least 30 calendar days before implementation.

4. Checkpoint IV — Determine readiness for all markets, full implementation

The fourth checkpoint will occur on [_____, 201_], when the Participants will evaluate the results of the first three phases of the new choice of Customized Trading Spreads quoting. If, after consultation with the Interested Parties and the Commission, the Participants believe that the Participants and Interested Parties are technically prepared for full implementation and this would not have an adverse impact on the investing public, the Participants will proceed with full implementation of all exchange-listed issues (if not already quoting in the new choice of Customized Trading Spreads), NASDAQ issues and all options on the issues (if not already quoting in the new choice of Customized Trading Spreads) on or before [_____, 201_].

F. Post phase-in process

The post phase-in process will begin at the end of the Phase-In Period (on or before [_____, 201_]) and will last no more than two months. The Participants will review the Phase-In Period and the impact of the new choice of Customized Trading Spreads on systems capacity, liquidity and trading behavior. The Participants will submit joint and/or individual studies that document the impacts of the new choice of Customized Trading Spreads and may contain a recommendation on whether there should be a uniform minimum increment for equities or options or both. Absent Commission action on the study and recommendations, each Participant will submit proposed rule changes to establish its choice of minimum increments by which equities or options are quoted on its market no later than 30 calendar days after the filing of the study.

Section VI — Fallback/recovery

The Participants, after consultation with the Interested Parties, have agreed that Phase I and Phase III of the Phase-In Period require specific procedures for Participant fallback. Throughout the period during which this plan is effective, however, the Participants will monitor the impact of the new choice of Customized Trading Spread-based quoting and will confer with the Commission on those impacts.

For options quoting during Phase I and Phase III, there will be no intra-day fallback to fractional pricing, and issues must quote on every exchange in the same format, either the new choice of Customized Trading Spreads or fraction. For equity quoting during Phase I and Phase III, there may be an intra-day fallback to fractional pricing, as a last resort after all other efforts have been exhausted to remediate the problem. Specific details of the fallback plan will be published prior to the [_____, 201_] start date. For equity issues, in the event that a regional exchange Participant experiences a problem on day one of Phase I or Phase III that would require a fallback to fractional quoting, the Participant must attempt to fix the problem and may halt trading if the primary exchange for affected issues continues to quote in the new choice of Customized Trading Spreads. A problem at one of the Participants on day one of Phase I or Phase III will not necessitate a trading halt or fallback to fractional quoting by the other Participants. However, if any of the primary exchanges revert back to fractional quoting on day two, all other equity Participants quoting the issues on the affected primary exchange will also revert back to fractional quoting for those issues. Any issues falling back to fractions must continue to quote in fractions until the Monday following the correction of the problem.

For option issues, a problem with one of the Participants during Phase I or Phase III will not necessitate a trading halt by the other Participants. If an options exchange on the following day must fallback to fractional quoting and multiple-listed issues are involved in the fallback, all options exchanges will fallback. If the underlying equity reverts back to quoting in fractions, options on that equity may continue to quote in the new choice of Customized Trading Spreads. If a Participant chooses to revert the options back to fractional quoting until such time as the underlying equity issues are ready to convert to the new choice of Customized Trading Spread quoting, the conversion must occur overnight, and for multiple-listed issues, all options exchanges quoting the issues must agree to fallback as well. Any option issues falling back to fractions must continue to quote in fractions until the Monday following the correction of the problem.

Any programmatic problems encountered by the Participants after day one of Phase I or Phase III and any capacity issues will be treated like any other production problem by each Participant and will be subject to their normal operating procedures. As noted above, however, the Participants will monitor the impact of the new choice of Customized Trading Spreads-based quoting on the industry throughout the time that this plan is effective and will confer with the Commission on the impacts. If a clearing or settlement entity cannot process the first day's trading activity, the Participants trading the issues cleared or settled by the entity will open for the new choice of Customized Trading Spreads on the following business day. If the clearing or settlement entity still cannot process trading activity, the Participants may halt trading in the issues until the entity can successfully process the first day's trades.

Each Participant will submit its own procedures on how to deal with open orders on issues quoting in the new choice of Customized Trading Spread format that will revert back to fractional pricing.

Section VII — Summary

The Participants with the cooperation of the Interested Parties have agreed upon an approach to implement a phased-in implementation program for the new choice of Customized Trading Spread quoting that provides the maximum safety for the industry and the investing public, while satisfying the Commission order on the new choice of Customized Trading Spread implementation.

The implementation of a limited number of equities (and options on those equities) quoting at pre-described price choices in the first phase tests the operational readiness of the industry and at the same time minimizes the ill effects to the investing public of a fallback to fractional quoting.

Following Phase I is an additional limited phase of new choice of Customized Trading Spreads quoting of equities and options at pre-described phased checkpoints. The goals of Phase IIA are to evaluate projected capacity estimates, impacts to liquidity and new trading patterns in advance of full implementation of the new choice of Customized Trading Spreads pricing.

Appendix C

Tick size standards around the world

Tick sizes vary globally, but mostly as a function of share price. This near-universal method of tick size variation (oscillating tick sizes according to share price) fails to account for a company's market float, liquidity and trading volume, among other characteristics. Effective tick size regimens should optimally be customized to these characteristics of each public company; computer technology is now at the point where mass customization of tick sizes could be cost-effectively achieved.

Market	Currency	Stock price per share	Tick size	Relative tick size ¹
Australia	AUD	< 0.10	0.001	≥ 0.1%
		0.10 to 0.50	0.005	5% to 1%
		> 0.50	0.01	≤ 2%
Austria	EUR	All shares	0.01	
Austria – ATX stocks	EUR	< 10.00	0.001	≥ 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
		≥ 100.00	0.05	≤ 0.05%
Bahrain	BHD	All shares trading in BHD	0.001	
		USD0.01 to USD0.50	USD0.005	50% to 1%
		> USD0.51	USD0.01	≤ 2%
Belgium	EUR	< 10.00	0.001	≥ 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
		≥ 100.00	0.05	≤ 0.05%
		Certain stocks > 10.00	0.005	≤ 0.05%
Brazil	BRL	All shares	0.01	
Bulgaria	BGN	All shares	0.001	
Canada	CAD	< 0.50	0.005	≥ 1%
		≥ 0.50	0.01	≤ 2%
Cyprus	EUR	< 3.00	0.01	≥ 0.33%
		3.00 to 59.98	0.02	0.67% to 0.03%
		≥ 60.00	0.05	≤ 0.08%
Czech Republic	CZK	< 200.00	0.01	≥ 0.01%
		200.00 to 999.9	0.1	0.05% to 0.01%
		≥ 1,000.00	1	≤ 0.1%

¹ Tick size as a percentage of price per share.

Market	Currency	Stock price per share	Tick size	Relative tick size ¹
Denmark – OMX C20 stocks	DKK	< 0.50	0.0001	≥ 0.02%
		0.50 to 0.9995	0.0005	0.1% to 0.05%
		1.00 to 4.999	0.001	0.1% to 0.02%
		5.00 to 9.995	0.005	0.1% to 0.05%
		10.00 to 49.99	0.01	0.1% to 0.02%
		50.00 to 99.95	0.05	0.1% to 0.05%
		100.00 to 499.90	0.1	0.1% to 0.02%
		500.00 to 999.50	0.5	0.1% to 0.05%
		1,000.00 to 4,999.00	1	0.1% to 0.02%
		5,000.00 to 9,995.00	5	0.1% to 0.05%
		10,000.00 to 49,990.00	10	0.1% to 0.02%
		≥ 50,000.00	50	≤ 0.1%
Egypt	EGP	All shares	0.01	
Finland	EUR	All shares	0.01	
Finland – OMXH25 stocks	DKK	< 0.50	0.0001	≥ 0.02%
		0.50 to 0.9995	0.0005	0.1% to 0.05%
		1.00 to 4.999	0.001	0.1% to 0.02%
		5.00 to 9.995	0.005	0.1% to 0.05%
		10.00 to 49.99	0.01	0.1% to 0.02%
		50.00 to 99.95	0.05	0.1% to 0.05%
		100.00 to 499.90	0.1	0.1% to 0.02%
		500.00 to 999.50	0.5	0.1% to 0.05%
		1,000.00 to 4,999.00	1	0.1% to 0.02%
		5,000.00 to 9,995.00	5	0.1% to 0.05%
		10,000.00 to 49,990.00	10	0.1% to 0.02%
		≥ 50,000.00	50	≤ 0.1%
France	EUR	< 10.00	0.001	≥ 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
		≥ 100.00	0.05	≤ 0.05%
		Certain stocks > 10.00	0.005	≤ 0.05%
Germany	EUR	< 10.00	0.001	≥ 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
		≥ 100.00	0.05	≤ 0.05%
Greece	EUR	< 1.00	0.001	≥ 0.1%
		1.00 to 2.99	0.01	1% to 0.33%
		3.00 to 59.98	0.02	0.67% to 0.03%
		≥ 60.00	0.05	≤ 0.08%
Hong Kong	HKD	≤ 0.25	0.001	≥ 0.4%
		0.255 to 0.50	0.005	1.96% to 1%
		0.51 to 10.00	0.01	1.96% to 0.1%
		10.02 to 20.00	0.02	0.2% to 0.1%
		20.05 to 100.00	0.05	0.25% to 0.05%
		100.10 to 200.00	0.1	0.1% to 0.05%
		200.20 to 500.00	0.2	0.1% to 0.04%
		500.50 to 1,000.00	0.5	0.1% to 0.05%

¹ Tick size as a percentage of price per share.

Market	Currency	Stock price per share	Tick size	Relative tick size ¹
Hong Kong (continued)	HKD	1,001.00 to 2,000.00	1	0.1% to 0.05%
		2,002.00 to 5,000.00	2	0.1% to 0.04%
		5,005.00 to 9,995.00	5	0.1% to 0.05%
Hungary	HUF	Certain shares	1	
		Certain shares	5	
Hungary – BUX stocks	HUF	All shares	1	
India	INR	All shares	0.05	
Indonesia	IDR	< 200.00	1	≥ 0.5%
		200.00 to 495.00	5	2.5% to 1%
		500.00 to 1990.00	10	2% to 0.5%
		2,000.00 to 4,975.00	25	1.25% to 0.5%
		≥ 5,000.00	50	≤ 1%
Ireland	EUR	All shares	0.001	
Ireland – ISEQ 20 stocks	EUR	< 10.00	0.001	≥ 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
		≥ 100.00	0.05	≤ 0.05%
Israel	ILS	All shares	0.01	
Italy	EUR	< 0.25	0.0001	≥ 0.04%
		0.25 to 0.9995	0.0005	0.2% to 0.05%
		1.00 to 1.999	0.001	0.1% to 0.05%
		2.00 to 4.9975	0.0025	0.125% to 0.05%
		5.00 to 9.995	0.005	0.1% to 0.05%
Japan	JPY	≥ 10.00	0.01	≤ 0.1%
		< 2,000.00	1	≥ 0.05%
		2,000.00 to 2,295.00	5	0.25% to 0.22%
		3,000.00 to 29,990.00	10	0.33% to 0.03%
		30,000.00 to 49,950.00	50	0.17% to 0.1%
		50,000.00 to 99,900.00	100	0.2% to 0.1%
		100,000.00 to 999,000.00	1,000	1% to 0.1%
		1,000,000.00 to 19,990,000.00	10,000	1% to 0.05%
20,000,000.00 to 29,950,000.00	50,000	0.25% to 0.17%		
≥ 30,000,000.00	100,000	≤ 0.33%		
Mexico	MXN	< 1,000,000,000.00	0.01	≥ 1 × 10 ⁻¹¹
Netherlands	EUR	< 10.00	0.001	≥ 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
		≥ 100.00	0.05	≤ 0.05%
		Certain stocks > 10.00	0.005	≤ 0.05%
New Zealand	NZD	< 0.20	0.001	≥ 0.5%
		≥ 0.20	0.01	≤ 5%

¹ Tick size as a percentage of price per share.

Market	Currency	Stock price per share	Tick size	Relative tick size ¹
Norway	NOK	< 0.50	0.0001	≥ 0.02%
		0.50 to 0.9995	0.0005	0.1% to 0.05%
		1.00 to 4.999	0.001	0.1% to 0.02%
		5.00 to 9.995	0.005	0.1% to 0.05%
		10.00 to 49.99	0.01	0.1% to 0.02%
		50.00 to 99.95	0.05	0.1% to 0.05%
		100.00 to 499.90	0.1	0.1% to 0.02%
		500.00 to 999.50	0.5	0.1% to 0.05%
		1,000.00 to 4,999.00	1	0.1% to 0.02%
		5,000.00 to 9,995.00	5	0.1% to 0.05%
		10,000.00 to 49,990.00	10	0.1% to 0.02%
Poland	PLN	≥ 50,000.00	50	≤ 0.1%
		< 50.00	0.01	≥ 0.02%
		50.00 to 99.95	0.05	0.1% to 0.05%
		100.00 to 499.90	0.1	0.1% to 0.02%
Portugal	EUR	≥ 500.00	0.5	≤ 0.1%
		< 10.00	0.001	≥ 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
Qatar	QAR	Certain stocks > 10.00	0.05	≤ 0.05%
		All shares	0.01	
Romania	RON	< 10.00	0.005	≥ 0.01%
		10.00 to 49.995	0.001	1% to 0.2%
		0.50 to 0.995	0.005	1% to 0.5%
		1.00 to 4.99	0.01	1% to 0.2%
		5.00 to 9.95	0.05	1% to 0.5%
		≥ 10.00	0.1	≤ 1%
Saudi Arabia	SAR	≤ 25.00	0.05	≥ 0.2%
		25.10 to 50.00	0.1	0.4% to 0.2%
		≥ 50.25	0.25	≤ 0.5%
Singapore	SGD	< 1.00	0.005	≥ 0.5%
		1.00 to 2.99	0.01	1% to 0.33%
		3.00 to 4.98	0.02	0.67% to 0.4%
		5.00 to 9.95	0.05	1% to 0.5%
		≥ 10.00	0.1	≤ 1%
Spain	EUR	≤ 50.00	0.01	≥ 0.02%
		> 50.00	0.05	≤ 0.1%
		Certain stocks	0.005	
Spain – IBEX35 and IBEX medium stocks	EUR	< 10.00	0.001	≥ 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
		≥ 100.00	0.05	≤ 0.05%
Sweden	SEK	< 0.50	0.0001	≥ 0.02%
		0.50 to 0.9995	0.0005	0.1% to 0.05%
		1.00 to 4.999	0.001	0.1% to 0.02%

¹ Tick size as a percentage of price per share.

Market	Currency	Stock price per share	Tick size	Relative tick size ¹
Sweden (continued)	SEK	5.00 to 9.995	0.005	0.1% to 0.05%
		10.00 to 49.99	0.01	0.1% to 0.02%
		50.00 to 99.95	0.05	0.1% to 0.05%
		100.00 to 499.90	0.1	0.1% to 0.02%
		500.00 to 999.50	0.5	0.1% to 0.05%
		1,000.00 to 4,999.00	1	0.1% to 0.02%
		5,000.00 to 9,995.00	5	0.1% to 0.05%
		10,000.00 to 49,990.00	10	0.1% to 0.02%
		≥ 50,000.00	50	≤ 0.1%
Switzerland – Blue chip stocks	CHF	< 0.50	0.0001	≥ 0.02%
		0.50 to 0.9995	0.0005	0.1% to 0.05%
		1.00 to 4.999	0.001	0.1% to 0.02%
		5.00 to 9.995	0.005	0.1% to 0.05%
		10.00 to 49.99	0.01	0.1% to 0.02%
		50.00 to 99.95	0.05	0.1% to 0.05%
		100.00 to 499.9	0.1	0.1% to 0.02%
		500.00 to 999.50	0.5	0.1% to 0.05%
		1,000.00 to 4,999.00	1	0.1% to 0.02%
		5,000.00 to 9,995.00	5	0.1% to 0.05%
		≥ 10,000.00	10	≤ 0.1%
Switzerland – Non-blue chip stocks	CHF	< 10.00	0.01	≥ 0.1%
		10.00 to 99.95	0.05	0.5% to 0.05%
		100.00 to 249.90	0.1	0.1% to 0.04%
		250.00 to 499.75	0.25	0.1% to 0.05%
		500.00 to 999.50	0.5	0.1% to 0.05%
		1,000.00 to 4,999.00	1	0.1% to 0.02%
		≥ 5,000.00	5	≤ 0.1%
Switzerland – SMI expanded stocks	CHF	< 0.50	0.0001	≥ 0.02%
		0.50 to 0.9995	0.0005	0.1% to 0.05%
		1.00 to 4.999	0.001	0.1% to 0.02%
		5.00 to 9.995	0.005	0.1% to 0.05%
		10.00 to 49.99	0.01	0.1% to 0.02%
		50.00 to 99.95	0.05	0.1% to 0.05%
		100.00 to 499.9	0.1	0.1% to 0.02%
		500.00 to 999.50	0.5	0.1% to 0.05%
		1,000.00 to 4,999.00	1	0.1% to 0.02%
		5,000.00 to 9,995.00	5	0.1% to 0.05%
		10,000.00 to 49,990.00	10	0.1% to 0.02%
				≥ 50,000.00
Turkey	TRY	≤ 5.00	0.01	≥ 0.2%
		5.02 to 10.00	0.02	0.4% to 0.2%
		10.05 to 25.00	0.05	0.5% to 0.2%
		25.10 to 50.00	0.1	0.4% to 0.2%
		50.25 to 100.00	0.25	0.5% to 0.25%

¹ Tick size as a percentage of price per share.

Market	Currency	Stock price per share	Tick size	Relative tick size ¹
UAE (Abu Dhabi)	AED	≤ 10.00	0.01	≥ 0.1%
		10.01 to 100.00	0.05	0.5% to 0.05%
		≥ 100.01	0.1	≤ 0.1%
UAE (Dubai)	AED	≤ 0.99	0.001	≥ 0.1%
		1.00 to 9.99	0.01	1% to 0.1%
		10.00 to 99.95	0.05	0.5% to 0.05%
		≥ 100	0.1	≤ 0.1%
United Kingdom – AIM stocks (GBP/USD/EUR)	GBP	< 10.00	0.0001	≥ 0.001%
		10.00 to 99.99	0.01	0.1% to 0.01%
		≥ 100.00	0.25	≤ 0.25%
United Kingdom – AIM stocks (GBX)	GBX	< 10.00	0.0001	≥ 0.001%
		≥ 10.00	0.25	≤ 2.5%
United Kingdom – FTSE 100 stocks	GBP	< 1.00	0.0001	≥ 0.01%
		1.00 to 4.9995	0.0005	0.05% to 0.01%
		5.00 to 9.999	0.001	0.02% to 0.01%
		10.00 to 49.995	0.005	0.05% to 0.01%
		50.00 to 99.99	0.01	0.02% to 0.01%
		100.00 to 499.95	0.05	0.05% to 0.01%
		500.00 to 999.90	0.1	0.02% to 0.01%
		1,000.00 to 4,999.50	0.5	0.05% to 0.01%
		5,000.00 to 9,999.00	1	0.02% to 0.01%
		≥ 10,000.00	5	≤ 0.05%
United Kingdom – FTSE 250 stocks	GBP	< 0.50	0.0001	≥ 0.02%
		0.50 to 0.9995	0.0005	0.1% to 0.05%
		1.00 to 4.999	0.001	0.1% to 0.02%
		5.00 to 9.995	0.005	0.1% to 0.05%
		10.00 to 49.99	0.01	0.1% to 0.02%
		50.00 to 99.95	0.05	0.1% to 0.05%
		100.00 to 499.90	0.1	0.1% to 0.02%
		500.00 to 999.50	0.5	0.1% to 0.05%
		1,000.00 to 4,999.00	1	0.1% to 0.02%
		5,000.00 to 9,995.00	5	0.1% to 0.05%
		10,000.00 to 49,990.00	10	0.1% to 0.02%
		≥ 50,000.00	50	≤ 0.1%
United States	USD	< 1.00	0.0001	≥ 0.01%
		≥ 1.00	0.01	≤ 1%

¹ Tick size as a percentage of price per share.

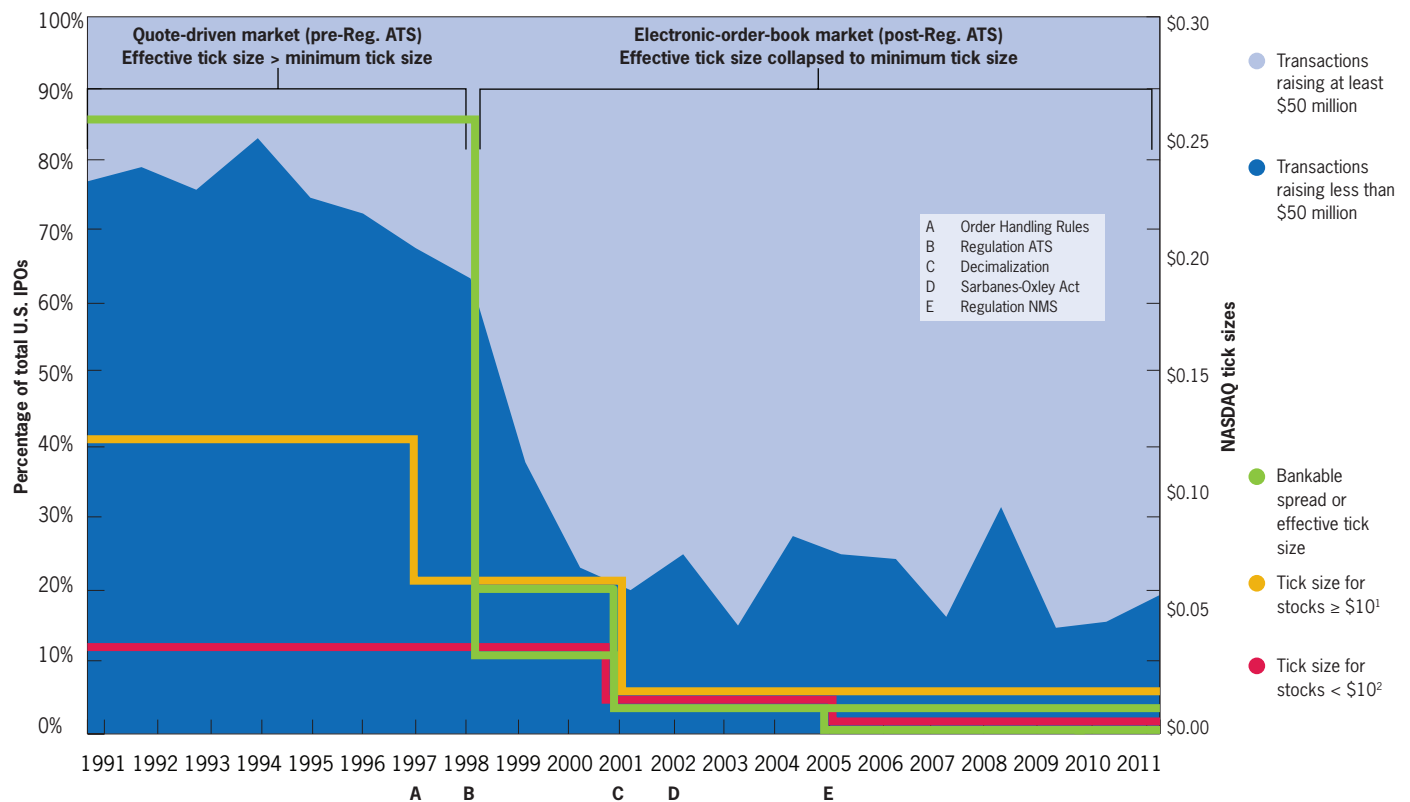
Appendix D

Tick size changes on the NASDAQ, NYSE and AMEX

For all three charts below:

Sources: Grant Thornton LLP, Capital Markets Advisory Partners LLC and Dealogic.
Includes corporate IPOs as of Dec. 31, 2011, excluding funds, REITs, SPACs and LPs.

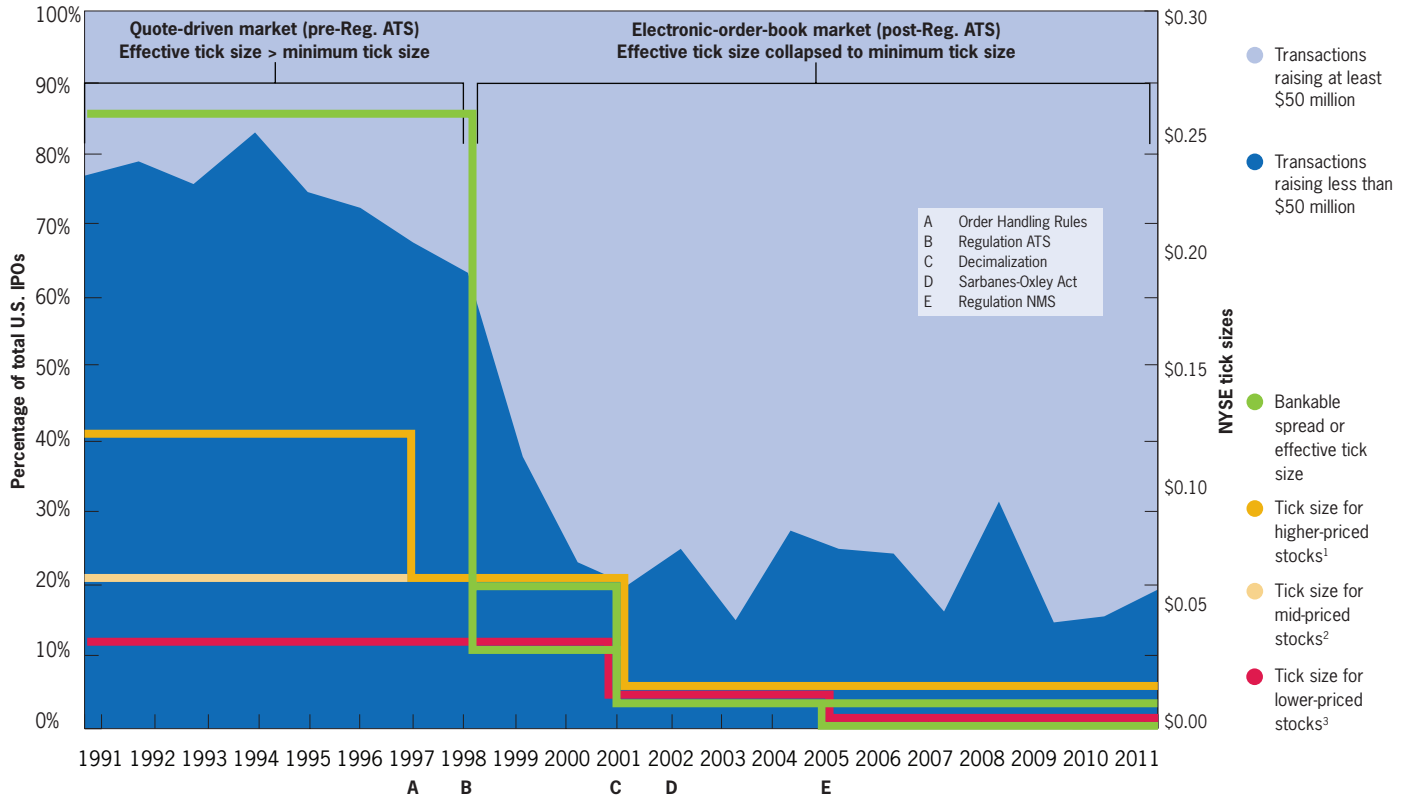
Tick size changes on the NASDAQ Stock Market overlaid on the drop in the number of small IPOs



¹1991: \$0.125 for NASDAQ stocks ≥ \$10; 1997: \$0.0625 for NASDAQ stocks ≥ \$10.

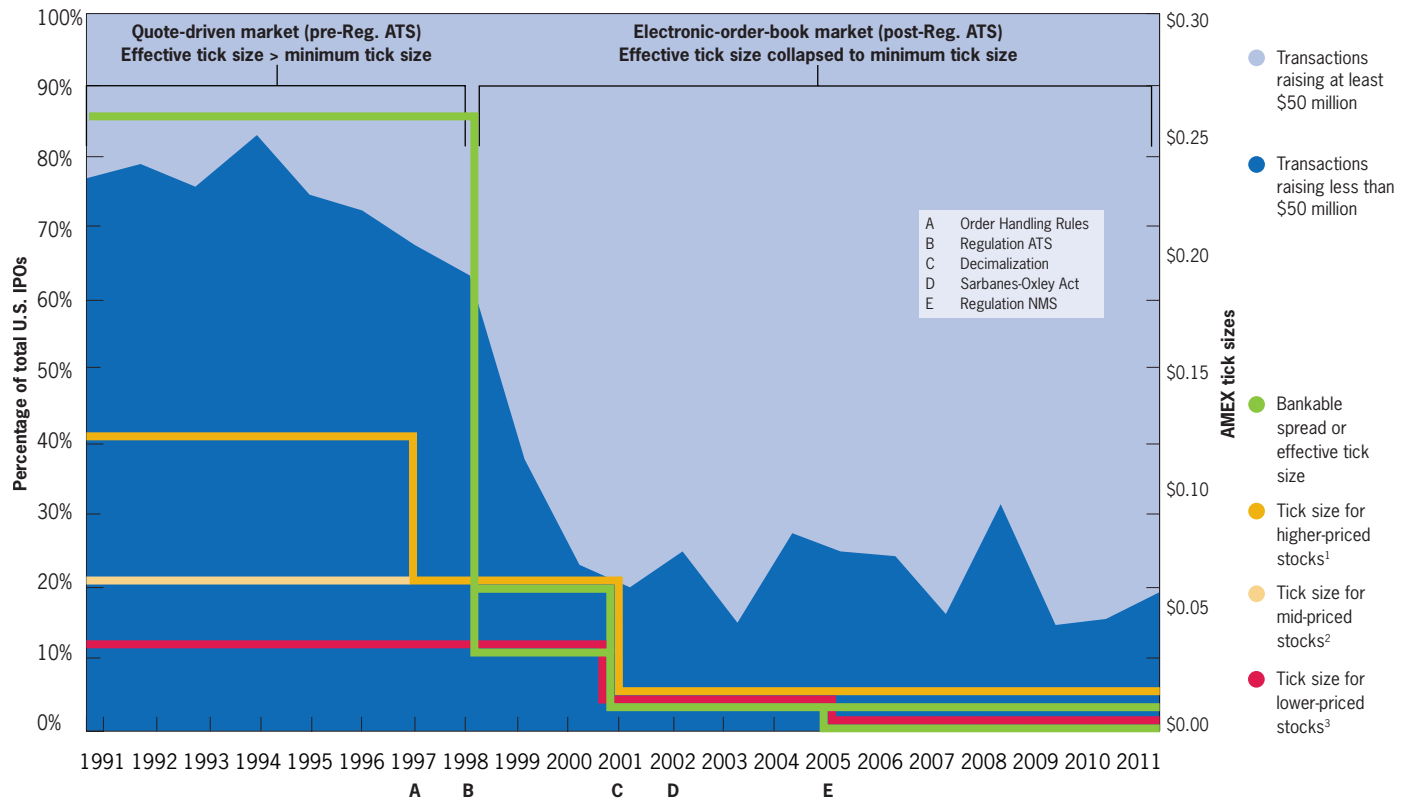
²1991: \$0.03125 for NASDAQ stocks < \$10.

Tick size changes on the New York Stock Exchange overlaid on the drop in the number of small IPOs



¹1991: \$0.125 for NYSE stocks > \$1; 1997: \$0.0625 for NYSE stocks ≥ \$0.50.
²1991: \$0.0625 for NYSE stocks > \$0.50 and < \$1.
³1991: \$0.03125 for NYSE stocks < \$0.50.

Tick size changes on the American Stock Exchange overlaid on the drop in the number of small IPOs



¹1991: \$0.125 for AMEX stocks ≥ \$1 (raised to ≥ \$5 in 1992, raised again to ≥ \$10 in 1995); 1997: \$0.0625 for AMEX stocks ≥ \$0.25.
²1991: \$0.0625 for AMEX stocks ≥ \$0.25 and < \$1 (raised to < \$5 in 1992).
³1991: \$0.03125 for AMEX stocks < \$0.25.

Appendix E

IPO economics

Today's investment banks lose money supporting small IPOs in the aftermarket and, as a result, provide very little "real" support

Small IPOs used to be very lucrative transactions for banks

1 bookrunner + 1 co-manager, 60/40 economics

Gross proceeds (GP)	\$25,000,000
Gross spread (GS, 7%)	\$1,750,000
Total management fee (MF, 20% of GS)	\$350,000
Total selling concessions (SC, 60% of GS)	\$1,050,000
Bookrunner's IPO fee (MF + SC)	\$840,000
Co-manager's IPO fee (MF + SC)	\$560,000

Pre-decimalization: Banks could make an additional 2x their IPO fees through aftermarket commissions and trading

Bookrunner's aftermarket revenue	\$1,680,000
Co-manager's aftermarket revenue	\$1,120,000
Bookrunner's net IPO-related revenue	\$2,520,000
Co-managers's net IPO-related revenue	\$1,680,000

Post-decimalization: Banks lose money in the aftermarket on small IPOs, giving back at least 10% of their IPO fees, resulting in a 70% decline in revenue

Bookrunner's aftermarket loss	\$(84,000)
Co-manager's aftermarket loss	\$(56,000)
Bookrunner's net IPO-related revenue	\$756,000
Co-managers's net IPO-related revenue	\$504,000

Today's small IPOs look very different

2 bookrunners + 3 co-managers, 40/30/15/10/5 economics

Gross proceeds (GP)	\$25,000,000
Gross spread (GS, 7%)	\$1,750,000
Total management fee (MF, 20% of GS)	\$350,000
Total selling concessions (SC, 60% of GS)	\$1,050,000
Bookrunner A's IPO fee (MF+SC)	\$560,000
Bookrunner B's IPO fee (MF+SC)	\$420,000
Co-manager C's IPO fee (MF+SC)	\$210,000
Co-manager D's IPO fee (MF+SC)	\$140,000
Co-manager E's IPO fee (MF + SC)	\$70,000

Given the crowded covers and expected aftermarket losses, small IPOs are not nearly as lucrative as they used to be

Net IPO-related revenue

Bookrunner A	\$504,000
Bookrunner B	\$378,000
Co-manager C	\$189,000
Co-manager D	\$126,000
Co-manager E	\$63,000

Deal sizes must be 5x-7x larger in order for bookrunners to generate the same level of revenue as they did pre-decimalization

Proceeds required to duplicate pre-decimalization revenue

Bookrunner A	\$125,000,000
Bookrunner B	\$166,666,667

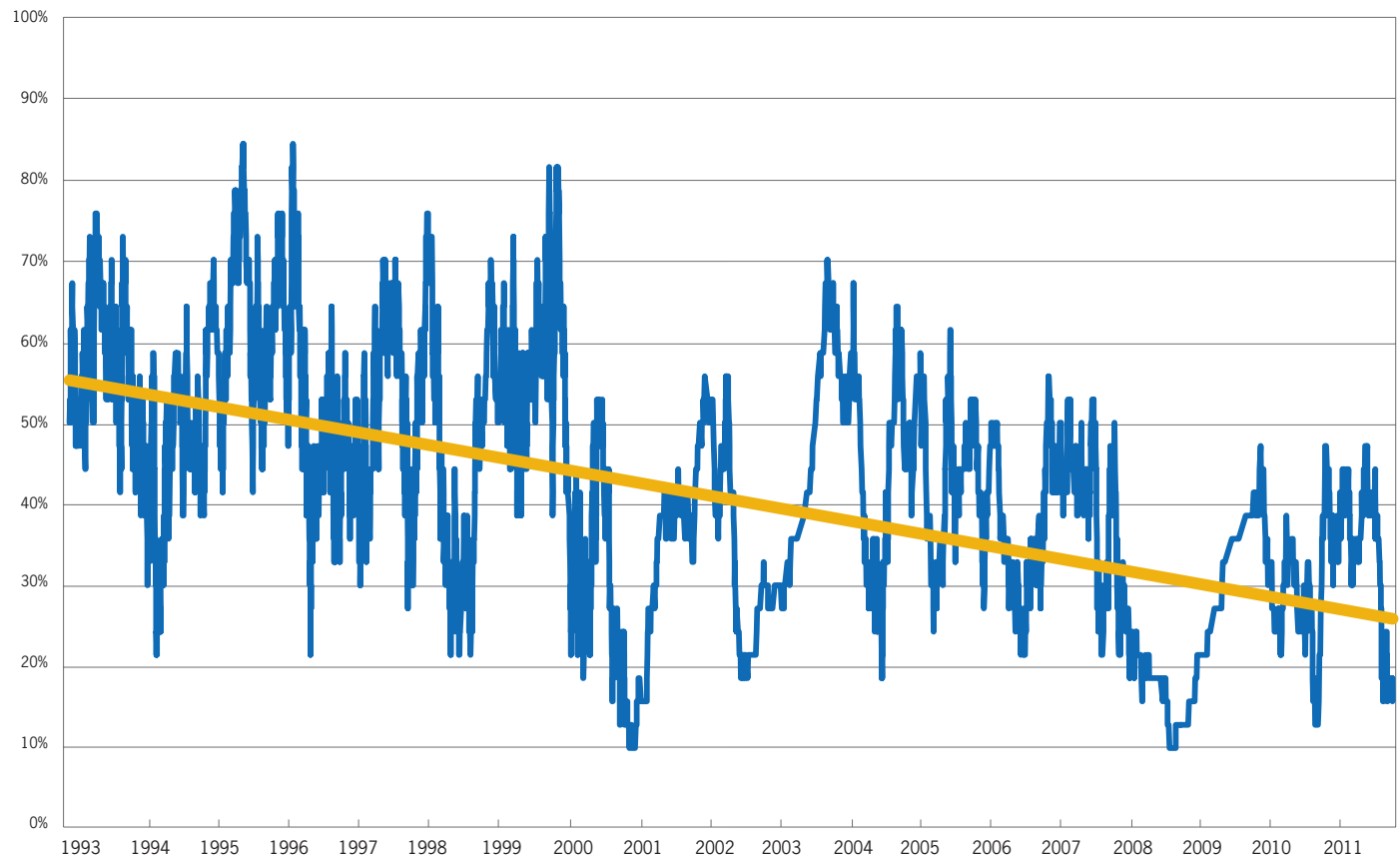
Source: Capital Markets Advisory Partners LLC.

Appendix F

IPO success rates

There is a secular decline in IPO success rates that is independent of the Sarbanes-Oxley Act. Companies going public today are failing at increasingly higher rates as more deals are being withdrawn, priced below their initial filing range and trading below their offer price. This decline in IPO success rates has been exacerbated by the steady degradation in equity sales coverage of institutional and retail investors that is a reaction to the erosion in bankable spreads and commissions.

Success rate of all IPOs

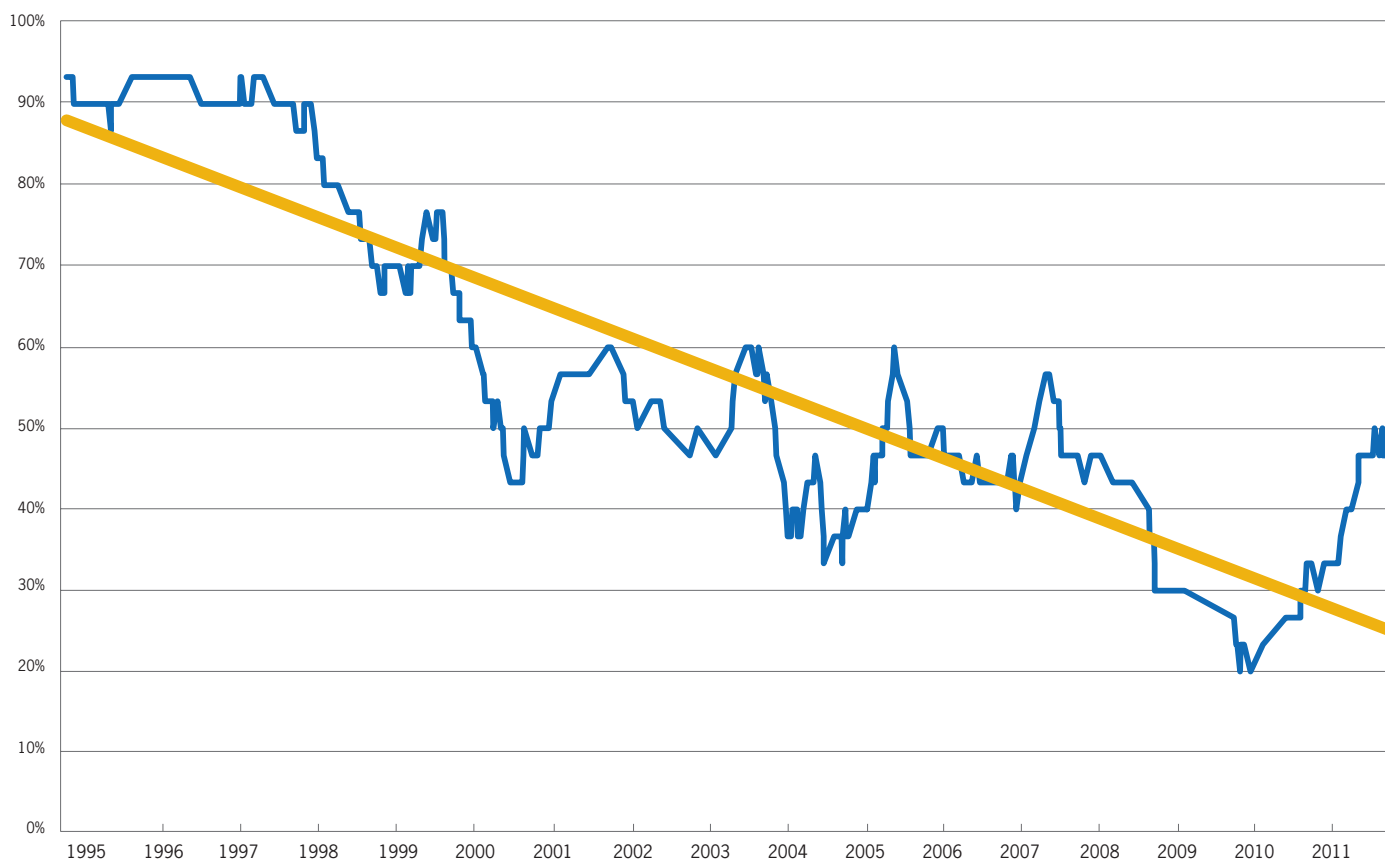


Source: Capital Markets Advisory Partners LLC.

Includes only corporate issuers, excluding funds, MLPs, SPACs and REITs.

Based on the average success rate of the last 30 filed deals, up to one year ago. A successful deal is defined as: 1) priced within one year of filing, 2) priced at or above the low end of the filing range, and 3) trading at or above issue price one month after pricing.

Success rate of IPOs with proceeds greater than \$500 million

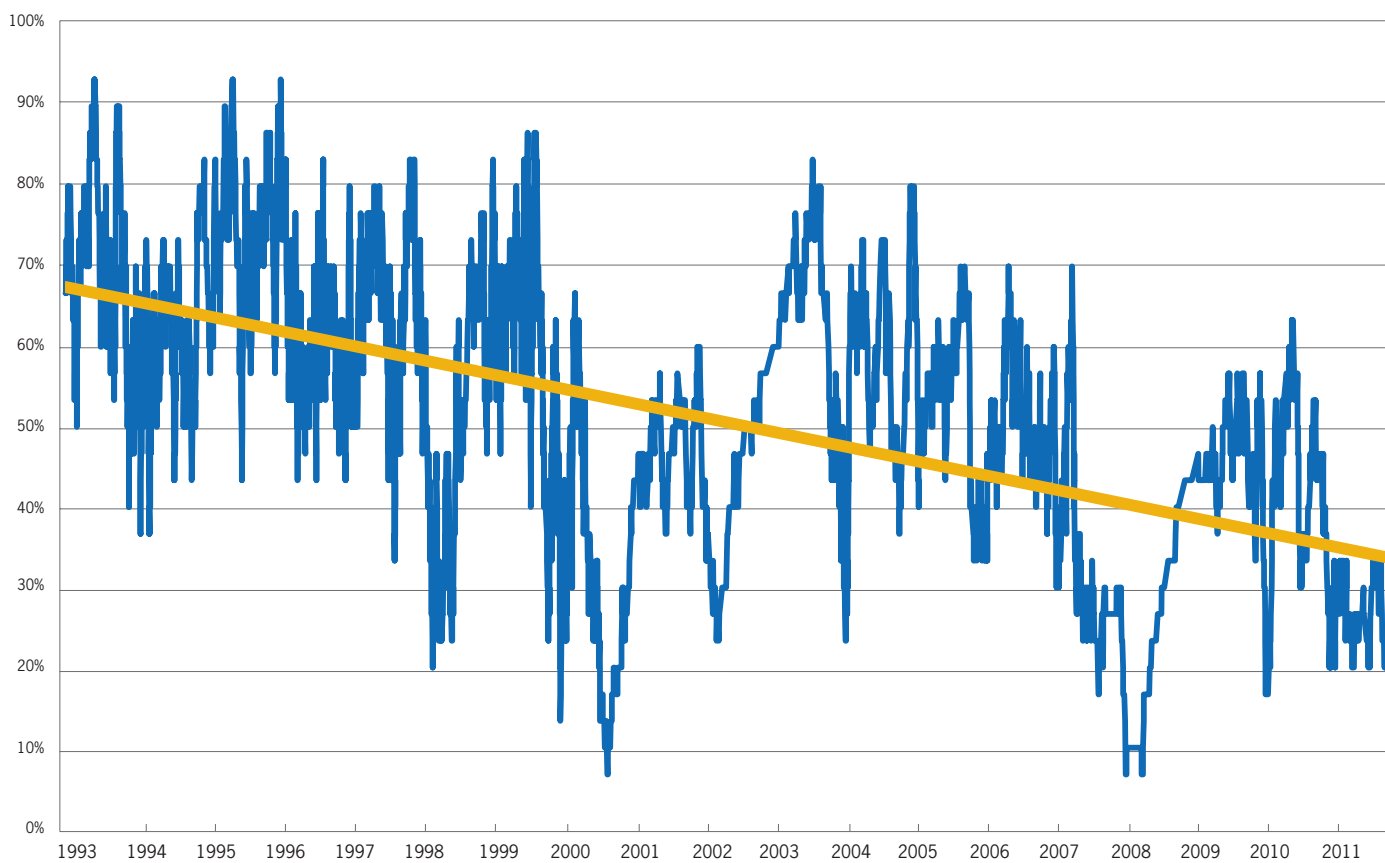


Source: Capital Markets Advisory Partners LLC.

Includes only corporate issuers, excluding funds, MLPs, SPACs and REITs.

Based on the average success rate of the last 30 filed deals, up to one year ago. A successful deal is defined as: 1) priced within one year of filing, 2) priced at or above the low end of the filing range, and 3) trading at or above issue price one month after pricing.

Success rate of IPOs maintaining issue price one month after going public



Source: Capital Markets Advisory Partners LLC.
Includes only corporate issuers, excluding funds, MLPs, SPACs and REITs.
Based on the average success rate of the last 30 filed deals, up to one month ago. A successful deal is defined as trading at or above issue price one month after pricing.

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