Shell Games:
On the Stock Price Performance of Shell Companies

IOANNIS V. FLOROS and TRAVIS R. A. SAPP*

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* Ioannis Floros may be reached at College of Business, 3346 Gerdin Business Bldg., Iowa State University, Ames, IA 50011-1350, Phone: (515) 294-2269, Fax: (515) 294-3525, email: *ivfloros@iastate.edu.* Travis Sapp may be reached at College of Business, 3362 Gerdin Business Bldg., Iowa State University, Ames, IA 50011-1350, Phone: (515) 294-2717, email: *trasapp@iastate.edu.* We would like to thank Arnie Cowan, Ashish Tiwari, Brett Goetschius, editor and publisher of the Reverse Merger Report, and seminar participants at Iowa State University and the University of Iowa for helpful comments. We thank the PrivateRaise research team for providing us with proprietary data on all reporting shells, SPAC shells, and reverse merger shells prior to the company's official roll-out date. We also gratefully acknowledge grant support from the Iowa State University Business College which made this research possible.

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Abstract

In each of the last eight years reverse mergers have outnumbered traditional IPOs as a mechanism for going public, and shell companies are providing fuel for much of this growth. We study 585 trading shell companies over the period 2006-2008. The purpose of most of these shell firms is to find a suitor for a reverse merger agreement. These companies have no systematic risk, operations, or assets, and their share price tends to decline over time. When a takeover agreement is consummated, shell company three-month abnormal returns are 48.1%. We argue that this exceptional return is compensation for shell stock illiquidity and the uncertainty of finding a reverse merger suitor.

In the last few years, reverse mergers (RMs) have become an important alternative to traditional IPOs, and shell companies constitute an integral part of RM transactions. In June 2005, the SEC defined any company with "no or nominal operations, and with no or nominal assets or assets consisting solely of cash and cash equivalents" as a shell company. Since then, all companies reporting to the SEC must indicate whether they declare themselves a shell company according to Rule 12b-2. Shell firms are traded either on the OTC Bulletin Board (OTCBB) or through Pink Sheets. Most shells come into existence either with the sole intent of merging with unidentified single or multiple companies (these are called virgin shells), after being created with a business plan that fails to materialize (these are called development stage shells), or after selling their operations and assets following bankruptcy (these are called natural shells).[1] Shell firms continue to undergo the costs of disclosure requirements imposed by the SEC in order to maintain their public status.[2]

Regardless of how they came into being, the sole purpose of most shell companies is to find a suitor for a RM deal.[3] RMs have become a popular way for a firm to go public in recent years while avoiding the delays and expenses of the traditional IPO process. There are five primary advantages to engaging in a RM rather than an IPO. First, by engaging in a RM with an existing reporting shell company, a firm can avoid having to go through the lengthy SEC review

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[1] A few shells are created by firms with operations for financial reasons; for example, for tax purposes (legal or otherwise), to avoid legal liability, or in order to collect income from new patents and other intangible assets. However, most shells typically state in their annual filings that their business plan is to be acquired by or merge with another firm.

[2] The costs of the imposition of disclosure requirements on smaller OTCBB firms are documented in Bushee and Leuz (2005). The approximate annual cost in legal and audit fees for a shell firm to maintain public status is $25,000 (Feldman (2006)).

[3] The merger is referred to as "reverse" because the shell firm is taken over, but survives the private company through its public status. More specifically, RMs are the corporate events whereby two simultaneous transactions take place; the publicly-traded shell company buys 100% of the stock of the private firm and the private firm buys the majority of the shares of the shell company as well as acquiring the majority of seats on the Board of Directors. Essentially, the owners and managers of the former private company become the owners and managers of the combined firm.

process. This can save the firm anywhere from 2-12 months. Second, less legal groundwork is needed, and therefore less legal expense. A RM typically costs $200,000 – 300,000 less than an IPO, and this does not include indirect IPO costs such as underpricing.[4] Third, the firm does not need to time the market since a limited percentage of the total stock is typically traded in the immediate post-RM period. Many IPOs are withdrawn at the last minute due to a perceived lack of interest among investors. Fourth, the private firm's managers don't have to spend lots of time doing road shows. And finally, the current owners generally own a large majority of the resulting public company.

RMs have grown in popularity from only three in 1990 to 236 in 2008, and shell companies are providing fuel for much of this growth. Only 26 of the RMs in 2008 were between two operating companies; the other 210 were shell RMs. There are currently over 1,400 reporting shell companies in existence.[5] Shells that are already trading in the market typically sell for around $1,000,000 and virgin shells, which do not trade, sell for around $100,000 (Feldman (2006)). Trading shells have the advantage of a shareholder base, which can facilitate exchange listing by helping to meet the minimum shareholder threshold. They also provide liquidity and a quicker exit strategy for the shell's founders. Given the growth of shells and the important role they play in the RM market, there has been a surprising lack of research into these investment vehicles and their performance. Do investors in trading shell companies earn a positive return over time? If not, why do they hold shares in a shell company? Do shell investors benefit from a RM agreement, and if so, by how much? In this paper, we address these questions and more.

[4] See Feldman (2006) and Floros and Shastri (2009) for more information on RM deal costs.

[5] According to DealFlow Media's May 2009 Reverse Merger Report. We have been able to get data on a total of 1,083 shell companies.

We obtain a proprietary detailed database of shell companies and their characteristics. This database is comprehensive, and does not suffer from survivorship bias. We examine the financial statements of 287 trading shell firms over 2006-2008 and confirm that they have no operations and no assets. We also find that the stock price of most shell firms tends to decay rapidly over time. The half-life of shell share prices is 172 trading days, or about eight months. So why do many investors continue to hold shell shares and why is the number of shell firms growing? We find that approximately half of all trading shell companies consummate a RM in a given year. Since these firms have no operations, investors must be solely attracted by an expectation of a future RM agreement.

To test whether this expectation is rational, we conduct an event study on a sample of 298 shell RM agreements during 2007-2008. Since only about 23% of shell firms in our sample trade on a given day, illiquidity is a concern in studying performance, and the potential for bid-ask bounce to bias returns is substantial. Accordingly, we compute daily shell returns using the midpoint of the quoted spread. We find a three-month cumulative abnormal return of 48.1%, which far surpasses other target firm abnormal returns in the takeover literature.[6] The expectation of such a takeover reward is apparently attracting investors into shells.

Following a RM, we find that the longer-term performance of the RM firms erases the high initial returns. The average surviving firm earns an annual post-event return of -91.2%. Shell companies engaging in RM transactions attract blockholder investment, largely from

[6] The takeover literature shows that acquired firms experience significant gains, while returns to acquirers are generally non-significant (Mandelker (1974), Dodd (1980), Asquith (1983), Bradley, Desai, and Kim (1983, 1988), Jensen and Ruback (1983), Stulz, Walkling, and Song (1989), Mulherin and Boone (2000), and Schwert (2000)). For example, Stulz, Walkling, and Song (1989) study 104 successful takeovers from 1968 to 1986 and report an average 39% target cumulative abnormal return for a window of five days before the first announcement by a bidder company to five days after the final revision in terms by the successful bidder. Schwert (2000) analyzes a sample of 2,296 completed takeovers over 1975-1996 and reports an average 22% abnormal return for a window of 63 days prior to 126 days after the takeover announcement.

insiders or family trusts, which persists beyond lock-up periods. We find evidence suggesting that naked short-selling occurs, mainly after the lock-up period of six months, for at least one-fifth of these firms. We show that this helps explain the decline in returns that begins about nine months after the RM. We also examine liquidity and find increased trading volume and a significant decrease in the quoted spread following a RM.

We use a Cox proportional hazard model to determine the factors that affect a shell firm's consummation of a RM deal. We find that shell firms incorporated in business-friendly states are more likely to consummate a RM sooner. Firms trading on Pink Sheets are more likely to find a RM deal more quickly, as these firms tend to have cleaner histories. We also find that the average time until a merger deal is consummated is 2.09 years. Firms that take longer than this may have problems, such as a messy history, that make them less attractive to potential suitors.

The literature on another type of shell company —Special Purpose Acquisition Companies (SPACs) — shows that these investment vehicles earn tepid returns prior to a RM agreement and earn negative returns upon consummation of a deal. The apparent attractiveness to investors of a SPAC is that the investment funds are collected and held in escrow pending a RM deal. If a deal is not consummated within 18 months, the shell is liquidated and the funds are returned to investors. We confirm for a sample of 111 SPACs that the average return from IPO to RM agreement is comparable to the risk-free return, and the return following a merger transaction is significantly negative. Evidently, SPAC investors, while protecting themselves from downside risk, are also sacrificing the large potential merger returns that ordinary shells offer.

Our results present a fascinating choice for investors. Namely, does it make sense to invest in an empty shell firm that has no assets or operations? Our results suggest that such an investment is rational as long as the probability of a RM happening soon is high. In the event of a RM deal, the shell firm returns are substantial. However, the wait can be painful. Over time, the shell burns cash to meet ongoing reporting costs and the share price tends to fall. Being able to identify shells that are more likely to consummate a deal sooner thus becomes key. Also, the extent to which shell firms are an investable alternative asset largely depends upon the depth of this rather illiquid market. Most shell firms have fewer than three market makers and trading tends to be thin and concentrated among a relatively small shareholder base. The median number of shareholders in our shell sample is 57 and on average 12% of shell outstanding shares are held by shell managers. Further, the median quoted half spread is 22.3%, showing that transaction costs for an investment in shell firms are non-trivial. We argue that the substantial average return surrounding a RM is compensation for shell stock illiquidity and the uncertainty of finding a reverse merger suitor. Further, the payoff from a shell investment is marginally sufficient to justify the growth in the number of shells alongside the growing RM industry.

The rest of this paper is organized as follows. Section I discusses the legal environment and process for shell RMs. Section II reviews the related literature. Section III describes the data and research method. Section IV analyzes the performance of shell firms in general. Section V examines the performance, liquidity, and ownership structure of shell firms surrounding a RM agreement. Section VI conducts a hazard analysis for the factors affecting the likelihood of a shell company consummating a RM deal. Section VII compares shell company performance to that of another type of shell —SPACs. Section VIII concludes.

I. Shell Reverse Mergers

A. Trading Environment

[Insert Figures 1 and 2]

The number of shell RMs has grown substantially in the last eight years. Figure 1 shows the number of shell RMs since 2000, when there were only 46. The number remained steady for three years, and then jumped from 46 in 2003 to 204 in 2004. It has remained above 200 per year since that time. In contrast, the number of traditional IPOs and penny stock IPOs has recently declined. Figure 2 compares four types of public offerings over the last 18 years. In this graph, the number of RMs reported includes non-shell RMs and SPAC RMs. The number of traditional IPOs fell dramatically after 2000 and has only slightly recovered since then. During this time, penny stock IPOs have fallen in number to almost zero, while the number of RMs has grown substantially. The number of RMs in each of the last eight years is greater than the number of traditional IPOs. Sellouts, where a private firm agrees to be acquired by a public company, have also increased in popularity over this time period.

Three important reasons for the recent dramatic growth of RMs are a change in regulatory framework, a change in the SEC attitude toward these deals, and an increase in the number of shell firms. Specifically, we partly attribute the significant increase in the number of RM transactions after 2003 to the introduction of the Sarbanes-Oxley Act (SOX) in July 2002 and the stringent reporting requirements that this legislation imposed on exchange-traded public companies. The imposition of SOX rules is deferred for OTCBB traded companies, which constitute a majority of RM transactions.[7] Another reason for the increase in RMs is the SEC required declaration of shell company status that went into effect in the first quarter of 2005.

[7] In December 2006, the SEC indicated that the deferral would end with annual reports for fiscal years ending after December 15, 2007.

This requirement obligates shell companies to file current reports, making them more transparent to private acquirers. The number of RMs remains high after the imposition of the stricter SEC rules on August 22, 2005.[8] The stricter rules have also helped shell companies to shed their negative image from the earlier part of the decade as a haven for fraud and abuse.[9]

B. Reverse Merger Process

A RM transaction follows a typical path. First, there is a due diligence process between the private and the shell company. The history of the shell company and its major stakeholders are investigated and relevant financial documents are assembled, including audited financial statements. A letter of intent is then prepared and negotiated. In this document both companies state their history, business focus, and forthcoming operational risks. If shareholder approval is required, the appropriate proxy statement is prepared and filed with the SEC.[10] If a financing is to take place at the same time as the merger (e.g. a PIPE transaction), then related documents, such as a private placement memorandum, are also prepared. Any problems from the shell's past, such as converting or paying off old liabilities, are cleaned up while the merger agreement is

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[8] On June 29, 2005, the Securities and Exchange Commission (SEC) adopted rules regarding publicly reporting shell companies. The rules are designed to ensure that investors in shell companies that acquire operations have timely access to the same type of information as is available to investors in public companies generally. The rules became effective on August 22, 2005 (30 days after publication in the Federal Register), apart from the amendment concerning Item 5.06 on new Form 8-K that required disclosure when companies cease to be shell companies. The latter became effective November 7, 2005. As adopted, the rules: a) require a public shell company to report on Form 8-K an event that causes it to cease being a shell company and to include in that Form 8-K the same type of detailed financial and other information about the company as is required to register a class of securities under the Securities Exchange Act of 1934, b) prohibit a public shell company from using Form S-8 (the abbreviated registration statement used to register securities issued under employee benefit plans) until 60 days after it ceases to be a shell company, and c) require every public company to check a box on the cover of all annual and quarterly reports to identify whether or not it is a shell company.

[9] According to the U.S. Department of Treasury report "The Role of Domestic Shell Companies in Financial Crime and Money Laundering (2006)," shell companies can serve in a number of illicit schemes such as money laundering and credit card fraud. These illicit uses have been more prevalent among privately held shells, as opposed to publicly traded shells, since the beneficial ownership is easier to conceal with a private shell company. The RM process has also been subject to abuse through "pump and dump" schemes whereby the expected value of the private company in a RM is fraudulently exaggerated, and investors buying into the company lose a substantial amount of their investment when the company turns out to be worth much less.

[10] Shareholder approval is not required for "triangular" RMs, where the public shell creates an empty, wholly-owned subsidiary and this subsidiary merges into the private company.

being negotiated. However, a shell's past problems are potential causes of delay or even withdrawals from RM negotiations. Virgin shells have an advantage in this regard, because they are created from scratch and have no history. If a change in the shell's board is anticipated upon completion of the RM, an additional SEC filing (S-14F) is prepared and submitted to the SEC, and also sent to the shareholders at least ten days prior to the closing of the deal.

After June 2005, the SEC imposed much stricter rules on the RM participants. They have to prepare an 8-K document prior to the closing and submit it to the SEC within four business days after the consummation of the RM deal. This document must include all the information that would be included otherwise in a Form 10-SB with respect to the merged company. Among other things, Form 10-SB includes the two most recent years of financial statements, the business focus of the new firm, the use of proceeds, the description of all potential risks, the executive compensation, any related-party transactions, the period-to-period comparative analysis and, finally, the list of stockholders, officers, and directors.

II. Literature Review

To our knowledge, there are several other papers in the academic finance literature on RMs, but no study explicitly analyzes shell companies. Gleason, Rosenthal, and Wiggins (2005) examine 121 RMs listed on the SDC Mergers and Acquisitions database. They find that the public firms involved in the RMs are generally poor performers prior to the merger. The firms identified in this sample are generally not shell firms, but larger public firms with existing operations. The RM announcements are associated with significant gains to the stocks of these companies. Based on this result, they conclude that RMs may provide shareholders of distressed firms a way to recover some of their investment. The authors report that only 46% of the companies in their RM sample survive after two years and conclude that RMs are a very risky mechanism for going public. However, Floros and Shastri (2009) do not support this conclusion. They find that 368 of the 408 firms in their sample (90.2%) survive three years after completing the RM. The main reason for the discrepancy is that Floros and Shastri (2009) include shell RMs traded either on the OTC Bulletin Board or through Pink Sheets.

Gleason, Jain, and Rosenthal (2006) compare traditional IPOs, RMs, and self-underwritten IPOs. They conclude that RM and self-underwritten IPO companies are smaller and of lower profitability. They show that these companies outperform their matched traditional IPO companies in the short run, but exhibit comparable performance three years following the going public decision.

Adjei, Cyree, and Walker (2007) focus on the survivability of 286 RMs and 2,860 SDC-listed IPOs. The public firms identified in this sample for RMs are generally not shell firms, but larger public firms with existing operations. They find that 42 percent of RMs compared with 27 percent of IPOs are delisted within three years of listing on an exchange. Additionally, they compute the most probable delisting time to be the 24th month for RMs and the 37th month for IPOs.

The paper that is closest in spirit to our study is Aydogdu et al (2007). They examine the trading activity of shell companies around RMs. They report an increase in trading activity following a merger announcement, and they report significant positive abnormal returns surrounding a RM deal. However, their sample is quite small at only 23 RMs, and they do not report cumulative abnormal returns or longer-term performance. Also, they do not study shell firm performance.

Two papers deal with the disclosure and minimum requirements set for Canadian RMs. Carpentier and Suret (2008) argue that Canadian RMs exhibit no improvement in operating performance, low survival rate, little post-listing financing activity, and low rate of return in the period after going public. They attribute their findings to the fact that RM firms do not meet stringent listing requirements. Additionally, Carpentier, Cumming, and Suret (2008) find that in IPOs, but not RMs, the involvement of a reputable auditor causes significant positive returns. They argue that only in the going public mechanisms offering a high level of disclosure, such as IPOs, the choice of the auditor adds significant economic value.

Floros and Shastri (2009) compare and contrast the decision to go public using RMs versus penny stock IPOs (PSIPOs). They hypothesize that RM companies are highly information asymmetric, since they do not conduct a public offering at the consummation of the deal. They argue that investors' evaluation cost for the private firm at the time of going public is irrelevant. To test this hypothesis, they analyze a sample of RMs of US-based private firms and US public firms obtained from the SDC Mergers and Acquisitions database and DealFlow Media's (DFM) Reverse Merger Report, with US PSIPOs listed in SDC's Global New Issues database.[11] They find that RM companies tend to be opaque as they release only a limited portion of their ownership structure to the public, which is not feasible in a traditional IPO.

In summary, with the exception of Aydogdu et al (2007) and Floros and Shastri (2009), the aforementioned academic work on RMs has been focused on transactions between two regularly-operating companies creating synergies after the consummation of the RM deal. Most existing work does not focus on shell company RMs, and no existing study focuses on shell

[11]The SDC and the DFM databases differ in that the former lists deals where the public company is usually a regular operating company while the latter lists deals where the public company is a shell company with no significant operations. Shell companies are considered to be blank check companies and are identified in Securities Exchange Commission (SEC) documents with Security Industry Classification (SIC) codes 6770 and 9995.

company performance. We believe this topic is interesting given the dramatic increase in the popularity of shell reverse mergers. Thus, our study focuses on the characteristics and performance of these vehicles which are being used to take private companies public.

III. Data and Methods

A. Shell Company Data

A primary reason that shell companies have not been studied in detail is a lack of data, as these firms are small and difficult to track. SEC reporting companies started declaring their shell status only after June 2005. We have acquired a comprehensive data set from DealFlow Media's PrivateRaise database. The data is proprietary and has not yet been marketed to other academics. The dataset identifies all reporting shell companies since 2001 as well as many of their characteristics.

We do not find survivorship bias to be a problem for the PrivateRaise data. If a shell stops reporting, which usually means that it has only temporarily lapsed in its reporting obligations, it still remains as a reporting shell company in PrivateRaise. A shell can bring itself up to date again by filing multiple 10-Qs or 10-Ks for the periods when its obligations had lapsed. Since our classification of a shell does not depend upon the exchange listing (there are a lot of reporting shells that are not listed at all), delisting or change in listing does not affect whether it is contained in PrivateRaise. In sum, a shell is not dropped from the database just because it did not file its 10-Ks and 10-Qs or got delisted from the OTCBB. However, PrivateRaise does deem as non-reporting a shell company that files a Form 15 to terminate its registration with the SEC.

DealFlow Media provided us with a number of useful data fields. Specifically, we have information on the shell companies' date of incorporation, date of latest filing, origin (natural, development stage, or virgin), current number of shareholders, current number of authorized shares, current number of shares outstanding, and state of incorporation. These firms are not traded on any of the main U.S. stock exchanges, and thus are not available on CRSP. Therefore, we gather stock price data, including bid and ask quotes and trading volume, from Thomson One Banker/DataStream to supplement this data. Financial information on the shell companies is gathered from Thomson One Banker/Worldscope.

[Insert Table 1]

Out of 1,083 identified shell firms, we are able to obtain market data on 287 trading shell firms over the period 2006-2008.[12] These are firms which have not identified a suitor for a RM agreement by the end of 2008. The monthly average number of shell firms without a suitor is increasing across time, starting at 163 in January of 2006 and ending with 260 in December of 2008. Table I reports statistics for the annual financial variables of the shell firm sample. Panel A reports the means and Panel B reports the medians. Due to extreme skewness and a few outliers, we focus on the medians. The median shell firm has a market capitalization of $5.64 million in 2006, and this number drifts downward across time. The median firm average market capitalization across all years is $2.74 million. The table shows that shell firms have very little in terms of total assets. Furthermore, the modest amount of assets is almost entirely held in cash by the median firm. Shell firms have virtually no sales, reflecting their lack of operations. Net income is negative, reflecting a lack of revenue and the ongoing expenses of maintaining public

[12] Many of the 1,083 shell firms are virgin shells and other shells that do not trade. Only 637 of the shell firms have ticker symbols and over half of these are not trading.

reporting status. The median firm has no capital expenditures, research and development, or debt. Finally, working capital is negative.[13]

[Insert Table 2]

Table II reports summary statistics for the quarterly financial variables. From this table, we may glean insight as to trends over time. In particular, we see that total assets and cash are generally trending downward over time. This makes sense, as shell firms burn cash to maintain their public reporting status. Net income and working capital are consistently negative and flat.

[Insert Figures 3 and 4]

Figure 3 shows the distribution of share prices of the shell firms. Most of these firms are penny stocks, with the median share price being $0.34. Figure 4 shows the distribution of shell firm quoted half spreads as a percentage of the midquote. The spreads are quite large compared to those of Nasdaq firms, which are generally less than 3%. The median shell firm half spread is 22.3%, and a number of firms have average spreads greater than 50%. Hence, transaction costs for this market are quite high, and a short-term investor may find a substantial portion of his funds consumed by the bid-ask spread.

The portfolio time series average daily trading volume is 210,000 shares. However, the daily average volume is highly positively skewed. The median daily volume is zero on all but two days of the sample period. We find that on average 23% of shells trade on a given day. One reason these stocks are so thinly traded is the concentration of ownership. The mean total number of common shareholders per firm is 309 and the median is only 57.

[13] We conduct further analysis on all reporting shell companies with declared total assets greater than $ 0.5 M in any of the years. We find that six currently reporting shell companies used to be regularly-operating companies in at least one of the years 2006-2007. The most frequently reported reason for discontinuing operations is the lack of success in research and development activities. All other shells with annual total assets exceeding $ 0.5 M are found to report only cash, trust funds, or short-term investment levels —thus, only nominal assets.

We further obtain from DealFlow Media a listing of 444 shell RMs taking place in 2007-2008. Of these 444, we are able to obtain market data on 298 firms. We use this additional sample of shell firms that merged to conduct an event study of the RM occurrence. We also add this sample of firms, only during the time they were trading as shells, to our sample of 287 shells which did not find a suitor during 2006-2008 in order to measure shell company performance and to conduct a hazard analysis. Thus, our total sample is comprised of returns data on 585 shell firms.

Finally, for part of our analysis, we implement the Fama-French three-factor regression benchmark model augmented with a momentum factor:

$$r_{p,t} = \alpha_p + \beta_{1,p} RMRF_t + \beta_{2,p} SMB_t + \beta_{3,p} HML_t + \beta_{4,p} UMD_t + e_{pt}. \tag{1}$$

Here, $r_{p,t}$ is the monthly return on a portfolio of shells in excess of the one month T-bill return; RMRF is the excess return on a value-weighted market portfolio; and SMB, HML, and UMD are returns on zero-investment factor-mimicking portfolios for size, book-to-market, and one-year momentum in stock returns from Ken French's website.

B. Computing Returns

One difficulty in computing the returns of smaller illiquid companies is the potential for bid-ask bounce to distort the return measured from trade prices. Blume and Stambaugh (1983) show that observed returns are upward biased due to price discreteness and bid-ask bounce. Bid-ask bounce arises when, for example, a sell too small to move the posted quotes is executed. The recorded trade price is equal to the bid price. Then, another small trade, this time a buy, is executed and the closing price is recorded at the ask. The posted quotes may not have moved at all, yet there will be a negative return, followed by a positive return based upon the recorded trade prices. Clearly, the economic value of the stock has not changed. The price has returned to its original value prior to the trading activity, yet there are two returns, with the positive return being larger than the negative return. On average, the effect of bid-ask bounce will lead to an upward bias in computed returns which can be quite substantial, especially when measuring returns daily.

There are two common approaches to mitigating the effects of bid-ask bounce. Blume and Stambaugh (1983) and Conrad and Kaul (1993) note that using buy-and-hold returns over longer holding periods, such as a year, essentially eliminates the effects of bid-ask bounce. However, this approach is impractical when higher frequency data is desired, for example to conduct an event study. An alternative solution is to use the quote midpoint as an estimate of the true value of the security. Fisher, Weaver, and Webb (2009) find that computing returns from the quote midpoint is effective for removing the majority of upward bias for securities with large spreads of 5% or more.

We find that the bid-ask bounce bias for the shell firm sample is quite severe at the daily frequency. The average daily return computed from shell stock prices is four times as large as that computed from the quote midpoints. The difference is purely attributable to the upward bias of bid-ask bounce. Accordingly, we compute all shell company returns using the midpoint of the quoted spread.[14]

Even after mitigating bid-ask bounce, we find that a further bias is present in the returns data for many of the shell firms. Specifically, the arithmetic mean return for a shell stock is often positive while, due to high volatility, the geometric mean is negative. In other words, the arithmetic average can be positive, while the stock price is falling over time. Therefore, while we use a time series of shell portfolio returns to estimate market exposure, we do not rely on these returns for calculating performance.

[14] For all return calculations, we exclude daily returns greater than 1000% as probable data recording errors.

IV. Shell Firm Stock Price Performance

A. Shell Firm Risk

Since shell firms have no assets and produce no cash flows, we hypothesize that shell firm returns are uncorrelated with the market. In order to assess the systematic risk exposure of shell firms, we form a portfolio of daily shell firm returns using our sample of 585 shell companies. We then regress shell firm excess returns on the four factor model in equation 1.

[Insert Table III]

The results are reported in Table III. None of the beta coefficients is significantly different from zero. The R-squared is essentially zero. This confirms that shell firm returns are not correlated with the market or with returns based on size, book-to-market, or one-year momentum. Regression using monthly data also produces insignificant coefficients. We hasten to point out that shell firms are not without risk; however, the risk is all idiosyncratic. Stock prices tend to decay rapidly for the vast majority of shell firms. Over the sample period, only 50% of trading shell firms find a suitor.[15] Out of the 287 shell firms which do not find a suitor, 29 firms' stock prices decline to zero during 2006-2008.

Pastor and Stambaugh (2003) find that market-wide liquidity is a priced factor in the cross-section of stock returns. Given the illiquidity of shell stocks, we also regress shell returns against the liquidity factor of Pastor and Stambaugh (2003) from Rob Stambaugh's website. Due to data availability, this regression is conducted at the monthly frequency. In non-tabulated results, we find that the coefficient on liquidity is not significantly different from zero, indicating that there is no correlation between shell returns and market-wide liquidity.

B. Shell Firm Returns

[15] Over 2007-2008 there are 191 shell firms in our sample with a significant trading history extending prior to the 30 days before they conduct a RM. We estimate that an additional 96 trading shells conduct a RM during 2006, totaling 287. There are also 287 trading shell firms over the sample period which do not find a suitor for an RM.

[Insert Figures 5 and 6]

Figure 5 displays the average daily return of the portfolio of shell companies over the sample period. There are clearly more positive returns than negative returns. The arithmetic mean daily return is 0.20% which compounds to an astounding 63.9% annually. However, as argued above, this is not a reliable measure of performance. Despite the positive mean return, we find that 79% of shell firms *decrease* in value over time. Further, this decrease is rather rapid. Turning to buy-hold returns, the sample average of the geometric mean daily returns is -0.40%, or -63.8% annually. Based on this number, the half-life of the stock price in a typical shell is 172 trading days, and a dollar invested is worth, on average, only 36 cents a year later. We find no significant difference in performance between the shell firms that eventually find a RM suitor during the sample period and those that do not. It appears that the market is unable to distinguish which shell firms will be successful in consummating a RM.

To illustrate, Figure 6 graphs the stock price of a typical shell firm. The value of the shell stock is seen to be deteriorating over time. The arithmetic mean daily return is 0.31% which compounds to 118% per year. However, the geometric mean daily return is -0.50% which compounds to -72% per year. We find that 21% of our sample has both a positive arithmetic and geometric mean return, and another 38% of our sample has a positive arithmetic mean return, but a negative geometric mean return. The final 41% of our sample has both a negative arithmetic and geometric mean return. Clearly, the arithmetic mean return is strongly upward biased and is not reflective of true performance for the majority of the shell sample.

Shell insiders are often issued stock at minimal cost and so have a low cost basis for their shares. They hold blocks of shares and likely find it difficult to exit. However, if most shell firm stocks tend to decline in value, and do so rapidly, then why are shell firms able to attract outside investors? They have no assets, operations, or liquidation value. We hypothesize that investors hold shares solely in anticipation of an eventual RM agreement and a substantial return surrounding the RM deal. We next examine whether this expectation is rational.

V. Performance, Liquidity, and Ownership Surrounding Reverse Mergers

A. Performance

We conduct an event study on the performance of a sample of 298 shell firms that complete a RM during 2007-2008. For each firm we have the date, provided by DealFlow Media/PrivateRaise, on which the RM deal was consummated.[16] The event window runs from 30 trading days prior to the merger agreement to 30 days after. Since shell firms have no operations, assets, or systematic risk, the expected daily return for each firm is zero. Alternatively stated, we treat all returns as abnormal.

[Insert Figures 7 and 8]

Figure 7 shows the returns surrounding a RM in event time. We see substantial positive returns clustered around the event date, with returns from days 0 to +3 being statistically significant. The pattern becomes clearer when viewing the cumulative abnormal returns (CARs), which are displayed in Figure 8. Table IV reports numerical results for the event study, and Table V reports CARs for various event windows. We see a build-up of returns 30 days prior to the event date of 15.4% (*t*-statistic = 2.74). The 11-day CAR for the window [-5, +5] is 28.9% (*t*-statistic = 6.15). Over the entire 61-day event window the CAR is 48.1% (*t*-statistic = 6.30).[17]

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[16] The date is retrieved from the 8-K document submitted to the SEC within four business days after the consummation of the RM.

[17] In a separate non-tabulated analysis we compute the RM CARs for the subsample of 55 reporting shell companies that submit an SB-2 form to the SEC. In form SB-2 public companies describe their security offerings and SB-2s are required by the SEC in order to be able to resell, other than to Qualified Institutional Buyers, restricted shares to the public. We associate SB-2s with greater company transparency. Consistent with this, we find that the SB-2 shell

[Insert Figure 9 , Table IV, and Table V]

The longer-run performance of the RM firms is far less spectacular than the initial returns. The cumulative returns for [-30, +390] are displayed in Figure 9. The average annualized buy-hold return for the post-event window [+31, +390] is -91.2% (*t*-statistic = -12.50). We see from the figure that the returns begin to decline around 180 trading days after the RM. For many of these firms, a substantial number of new shares are restricted from trading for 6-12 months after the RM due to lock-up provisions, or other restrictions under SEC Rule 144. About the time that these restrictions end, we see the beginning of a drop in returns. This may be due to insiders exiting or to short-selling activity, issues we explore further under the discussion of ownership.

Many shell firms that are entering into negotiations for a RM with a private firm will announce this fact with a formal letter of intent. This can precede the actual RM by a number of months, or just days. We hypothesize that firms announcing an intended RM begin to experience abnormal returns at this announcement date. To test this, we hand-collect all letter of intent announcements for our sample of 298 RM agreements, yielding 75 letter of intent announcement dates.[18] Of these, 26 fall within 30 days of the actual RM date. Therefore, we use only the remaining 49 observations to conduct an event study of the letter of intent announcement. We look at the window from 30 days prior to the merger agreement to 30 days after.

[Insert Table VI]

The results are in Table VI. The CAR over the 61-day event window is considerable at 54.0% (*t*-statistic = 4.07). Over the shorter window of 11 days surrounding the announcement,

companies exhibit higher trading volume and lower CARs surrounding the RM event when compared to the entire shell company sample. We further examine whether the use of SB-2 documents for the consummation of PIPE transactions occurs concurrently with the RM deals. We indeed find that 21 out of the 55 SB-2 shell companies have consummated a PIPE transaction, with their SB-2 filing becoming effective prior to the RM/PIPE closing date.

[18] The letter of intent date was clearly stated either in press releases preceding the RM deal or in Item 1 of the 8-K document submitted to the SEC within four business days after the consummation of the RM deal.

the CAR is 35.7% (t-statistic = 3.72). A graph of the CARs is displayed in Panel A of Figure 11. We see that even over the run-up period of [-30, -1] prior to the announcement there is a positive and significant CAR of 26.2%. This indicates that the pending announcement is partially anticipated in the market.

[Insert Figure 10]

We also examine the RM event separately for these 49 firms which have an earlier announcement of an intent to merge and find that the CAR over the window [-30, +30] is 17.4% (t-statistic = 1.33). A graph of the RM CARs is displayed in Panel B of Figure 10. The 11-day CAR for [-5, +5] is 18.9% (t-statistic = 2.10). Thus, the positive abnormal return from the RM deal is not as large for the firms which have already declared a letter of intent. Since firms occasionally back out of an announced deal, it is understandable that a second, smaller return would occur at the consummation of the RM.[19]

Overall, we find substantial returns to shell firm investors surrounding an RM transaction, including a letter of intent. Given that share prices fall for 79% of our shell sample, we may estimate the timeframe required for an investment in the typical shell to be profitable to an outside investor. Based on the average rate of stock price decay and the RM CAR of 48.1%, it would take the typical shell firm about five months to drop to 1/1.481 = 0.675 of its original value. This means that a typical shell firm would need to consummate a reverse merger transaction, or obtain a letter of intent, within five months for an investor to at least break even.

B. Liquidity

We examine the liquidity of the shell firms around the merger date by looking at trading volume, percent of firms trading, and quoted spreads. Looking at the 61-day event window, we

[19] Floros and Shastri (2009) identify 104 out of 892 RMs that were withdrawn over the period January 1979 to December 2005. Common reasons for withdrawal as reported by executives were: disagreement on the premium to be paid, current economic conditions, the merger process taking too long, and a superior alternate offer.

find an increase in the trading volume after the merger agreement. The average daily volume prior to the event date is 15,100 shares. The average trading volume after the event date is 28,800 shares. The difference of 13,700 shares is statistically significant, with a *t*-statistic of 7.02. Another measure of liquidity is the number of firms trading on a given day. We examine the percentage of firms trading each day during the 61-day event window. The average percentage of firms trading prior to the event date is 34.6%, and the average percentage of firms trading after the event date is 52.7%. The difference of 18.2% is statistically significant (*t*-statistic = 22.50).

Finally, we measure quoted spreads before and after the event date. We find that spreads decline in both absolute and percentage terms surrounding the merger agreement. The mean percentage quoted half spread over the 30 days prior to the event date is 18.4%, and the mean for the 30 days after the event date is 14.9%. The difference of 3.5% is statistically significant (*t*-statistic = 30.10). We hypothesize that the asymmetric information involved with the firm increases after the shell company absorbs the private company. Whereas the shell was a transparent company having essentially no financial variables, the new public company does have significant operations and financials. The decline in spreads is therefore likely due solely to a reduction in dealer processing costs for the more liquid post-merger firm.

C. Ownership

We next analyze the ownership structure surrounding the RM using a sample of 154 shell companies. Table VIII contains a comparison of the ownership characteristics of shell companies participating in RM transactions in the fiscal year prior and the fiscal year after the RM closing date. When the post-RM figures are reported any newly issued shares have become unrestricted as the SEC Rule 144 trading restriction, which lasts six months, will have ended. Also, any SB-2 forms will have become effective prior to the submission of the first 10-K document after the consummation of the RM deal. Thus, insiders and other investors will have had a chance to exit, and the post-RM blockholder ownership we report represents a state of relative equilibrium. The specific variables examined include the number of blockholders (persons or legal entities with greater than 5% holdings), the total blockholder ownership, the CEO total holdings, and the CFO total holdings. We note that it is almost always the case that the shell CEO and CFO are replaced following a RM. Panel A of the table compares ownership characteristics of all the shell firms. We also split the sample by median trading volume: Panel B presents results for companies with high trading volume and Panel C presents results for companies with low trading volume. Median values for each variable are reported along with Wilcoxon z-test statistics.

[Insert Table VII]

In Panel A of Table VII we find that the number of blockholders increases, the total blockholder ownership increases, the CEO holdings increase, and the CFO holdings decrease.[20] All changes except for the CEO holdings are statistically significant. We further investigate the identity of the blockholders following the RM deal. We find 73 out of 154 companies with corporations or funds participating as blockholders. Nineteen of them also have the owners/managers participating as blockholders. The 81 remaining companies have only persons and no legal entities participating in the ownership structure. Focusing on the corporations or funds participating as blockholders, 15 of these are family trusts owned by the shells' incumbent management, and a small percentage are reverse merger funds.

In the subsamples in Panels B and C we find that blockholder ownership significantly increases and CFO holdings significantly decrease. The increase in the number of blockholders

[20] We find that the CEOs in 25 out of 154 shell companies do not have any holdings in the company prior to the consummation of the RM deal. We further analyze these 25 companies and find that the CEOs in these companies are RM experts hired to facilitate the conclusion of the RM negotiations. The main holdings of these companies remain with trusts that are active in investing in shell companies.

and the increase in CEO holdings are evident only in the low-volume subsample.[21] Overall, we conclude that the increase in volume and returns around the RM closing date, as presented in Figure 14 and Table VI, is associated with a significant increase in blockholder ownership, but is not positively influenced by insider ownership. As in Ginglinger and Hamon (2007), we argue that the elevated presence of insider owners in the RM deals increases the adverse selection associated with the trading of the stock. Since we find that spreads decline following a RM, we conclude that dealer order-handling costs significantly decrease.

Finally, we consider the possibility of short-selling upon consummation of the RM, as shorting is a significant issue in some market segments such as PIPE transactions.[22] We do not believe short-selling is prevalent in the immediate aftermarket for several reasons. First, the availability of shares to short is likely to be extremely limited for these stocks. Many of these deals have embedded lock-up periods of at least six months where no public trading of the new shares is permitted, meaning liquidity is limited to the incumbent shareholders. Second, as we have shown, the average returns following a RM tend to be quite large and persist for several months before gradually declining. Placing negative bets on these new companies is not a winning strategy in the short or intermediate term. Third, as reported above, following a RM we find a substantial increase in the presence of blockholders, who tend to be better-informed traders. Lastly, the introduction of stricter reporting rules for shells and RMs by the SEC in June of 2005 has made it much more difficult to manipulate share prices through "pump and dump" or "distort and short" schemes.

[21] In non-tabulated results we also split the sample into high/low return subsamples and find that the results do not qualitatively differ.

[22] See, for example, the discussions in Fink (2004), Vardi (2007), and Brophy, Ouimet, and Sialm (2009) of institutional investor short-selling surrounding PIPE transactions.

As lock-up periods expire and the stocks become more widely traded, they become potentially vulnerable to short-selling, including naked short-selling. When shares are not borrowed and tendered to the buyer within the clearing time of three days, the trade is considered to have "failed to deliver." Naked short-selling causes the market for a stock to become diluted with an artificial over-supply of shares. This practice, taken to an extreme, can also be used to manipulate the price of smaller, illiquid stocks such as those trading on the OTCBB, by flooding the market with naked shorts in an effort to drive down the share price.[23] Because of the potential for abuse, the SEC has taken action to curb naked short-selling by implementing Regulation SHO in January of 2005. Among other reforms, this regulation sets up a "Threshold List" of securities inviting closer scrutiny from the SEC and which are subject to mandatory close-out requirements. A firm is placed on this list when, for five consecutive days, it has at least 10,000 Fails-to-Deliver (FTDs) and the FTDs comprise at least 0.5% of the firm's outstanding shares. Although FTDs are not a pure measure of naked short-selling since they can occur due to inadvertent errors, Boni (2006) finds a positive association.

The FTD data for all firms exceeding 10,000 FTD shares each day from January 2004 through March 2009 has recently been made available by the SEC on its website.[24] In order to assess whether RM firms are subject to possible naked short-selling, we examine FTDs for the post-RM firms over the period following the RM through March 2009. Using RM deals in 2007, we compute the FTDs for each firm as a percentage of the total shares outstanding.[25]

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[23] See, for example, the article on short-selling by SEC Chairman Cox in the Wall Street Journal, July 24, 2008, P. A15.

[24] The data is provided in searchable form at http://failstodeliver.com.

[25] We do not include 2008 RMs since there is insufficient time for lock-up periods to expire and the stock to become more widely traded.

We find that the SEC threshold value for "large" fails of 0.5% is exceeded for 67 out of 201 firms (33%) in our sample on at least one day. Furthermore, the 0.5% threshold is exceeded for at least five consecutive days for 40 of these firms (20%), meaning these securities would be classified as "threshold" securities with mandatory closeout requirements under Regulation SHO. Boni (2006) argues that these persistent fails are more likely the result of naked short-selling rather than inadvertent delivery delays. Boni also reports that 4% of U.S. equity issues, and no more than 11% of OTCBB and Pink Sheets issues, would have qualified as "threshold" securities prior to Regulation SHO. This number is likely lower during our sample period when Regulation SHO is in effect, yet we find 20% of our sample with persistent large FTDs. The average number of days between a RM and the first breach of the FTD threshold is 314 days (or about 220 trading days). Although this is not conclusive evidence of naked short-selling, it is certainly suggestive that this is present for many of these firms. Since we find that insiders and blockholders do not tend to exit in the year following the RM, this may help explain the decline in post-RM CARs observed after about 180 trading days after the event date.[26]

We also examine the percentage FTDs for trading shell firms which have not conducted a RM. We find that 49 out of 637 shell firms (8%) breach the 0.5% threshold on at least one trading day, and only 20 firms (3%) exceed the threshold for at least five consecutive days. Thus, there is less indication of potential naked short-selling among shell firms than among post-RM

[26] We find that nearly all of these persistent FTD firms have post-RM trading restrictions. In particular, we find that 22 of the 67 firms, or 33% of the sample, have a 6-,9-,12-,or 24-calendar month lock-up period reported in their SEC filings. In addition, 18/67, or 27% of the sample, conducted a PIPE concurrently with the RM transaction and issued shares that are restricted from public resale for at least six calendar months under Rule 144. Finally, 21/67, or 31% of the sample, issued restricted shares under Rule 144 as part of the RM deal. Thus, in total 61/67, or 91%, of these firms conduct RM deals with share public resale restrictions embedded for at least six calendar months. For six firms we could not find any information on trading restrictions.

firms. As the SEC has recently moved to strengthen Regulation SHO, we expect that naked short-selling will be less of a factor for these smaller less-liquid securities in the future.[27]

VI. Timing of Reverse Mergers

In this section we employ a Cox proportional-hazard model to predict the length of time until the RM transaction takes place. The semi-parametric proportional Cox model allows us to predict the firm's RM event in a panel setting, where some of the independent variables are time-varying. Cox proportional hazard models are frequently used to explain the timing of corporate finance actions (see, for example, Pagano, Roell, and Zechner (2002), Claessens, Klingebiel, and Schmukler (2003), and Doidge, Karolyi, Lins, Miller, and Stulz (2008)). The hazard model estimates the probability that in a given fiscal quarter a firm that has not conducted a RM transaction will do so (we employ data at the quarterly frequency).[28]

The dependent variable in the hazard model is an indicator for whether the shell firm has engaged in a RM. Explanatory variables include the time since incorporation, an indicator for whether the firm trades on the Pink Sheets, an indicator for whether the firm is incorporated in business-friendly Nevada or Delaware, a categorical variable for entity type (virgin, development stage, or natural), quarterly returns, quarterly average volume, quarterly reported authorized

[27] In October of 2007 the SEC eliminated the grandfather exception to Rule 203 of Regulation SHO, requiring mandatory close-outs of pre-Regulation SHO persistent FTDs, and in September of 2008 the SEC removed the so-called market-maker exception to the ban on naked short-selling and implemented a strict T+3 close-out rule. An SEC Office of Economic Analysis study published March 20, 2009, finds that these rule changes reduced FTDs by 47% across all securities and reduced the daily number of threshold list securities by 69%.

[28] The hazard model estimates the probability (hazard rate) that a firm that has not conducted a reverse merger will consummate one in a given fiscal quarter. The hazard rate in the model is the instantaneous rate of conducting a reverse merger for companies that have not consummated one before. The hazard model assumes that the hazard rate for firm j, $h(t/x_j)$, is a function of the independent variables x_j and is written as $h(t/x_j) = h_0(t)\exp(x_j\beta_x)$, where β_x is a vector of coefficients to be estimated. The hazard function is composed of two parts: the baseline hazard $h_0(t)$, and the relative hazard. The Cox model is a semi-parametric model in that it estimates the coefficients of the independent variables without making any assumption about the nature or shape of the hazard function. The model assumes that the shape of the baseline hazard is the same for all companies.

shares, and quarterly reported common shares (gathered from 10-Q SEC filings). Since some of the variables in our models are quantitative, we report the statistic obtained by subtracting one from the hazard ratio and multiplying by 100.[29]

[Insert Table VIII]

The results are presented in Table VIII. We report the results of four models based on 144 shell companies incorporated within the period 2006-2008. In model 1 we only use time-independent variables. We find that, when controlling for all other covariates, the shell companies that are incorporated in either Nevada or Delaware exhibit on average an expected time to conduct a RM that is 69% lower than shells incorporated in any other state. The shell companies that are development stage entities exhibit on average 21% less time to conduct a RM than natural shell companies and 42% less time than virgin shells. Finally, shell companies that are traded on the Pink Sheets have on average a 60% lower time to consummate a RM transaction than shell companies that are traded mainly OTCBB. All covariates are statistically significant at the 10% level.[30] In model 2 we use the previously described time-independent variables together with quarterly returns. The exchange dummy variable and the state dummy variable are statistically significant, now at the 5% level. The shell companies traded on the Pink Sheets still exhibit a lower time to conduct a RM transaction, and the Nevada and Delaware incorporated shells also still consummate a RM transaction earlier. However, the quarterly returns and the shell type indicator are insignificant. Model 3 includes average quarterly volume

[29] The hazard ratio indicates the probability of the event taking place conditional on not having happened before. For indicator variables with values one and zero, we can interpret the hazard ratio as the probability of the estimated event (hazard) for those with a value of one to the estimated hazard for those with a value of zero (controlling for other covariates). For a detailed explanation of hazard model estimates, see Allison (1995).

[30] In non-tabulated results, we re-estimate model 1 for all shell companies incorporated in the years spanning the period of 1990-2008 and 1980-2008, respectively. The main qualitative change in our results is that the shell type indicator is significant and positive, showing that virgin shell companies significantly shorten the average time to consummating a RM.

information, and the results do not qualitatively change from model 2. The time-dependent quarterly trading volume variable is not significant. The only significant covariates are the exchange and the state of incorporation indicator, both of which shorten the average time to complete a RM transaction. Finally, in model 4 we include two additional time-dependent variables, the quarterly authorized and outstanding common shares. Both are seen to be insignificant. The only explanatory variable that is significant is the state of incorporation.[31]

Overall, three results stand out. First, we find that shell companies trading on the Pink Sheets exhibit a lower time to conduct a RM transaction. These shells likely have cleaner histories making them easier on which to conduct the due diligence process.[32] Second, the Nevada and Delaware incorporated shells consummate a RM transaction earlier. These states are generally considered to have the most business-friendly corporate environments.[33] Third, we conclude that time-varying data (returns, volume, and common and authorized shares) do not significantly impact the timing of the RM transaction.

Finally, we calculate the mean survival time of the reporting shell companies. We partition the sample into increasingly inclusive sets for shells that are incorporated after 2006, after 1990, and after 1980, respectively. This allows us to estimate the speed of successfully completing the RM negotiations under different regimes. Specifically, prior to 2006, the SEC did

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[31] In Model 4 we observe a significant drop in the number of events analyzed, where only seven RMs are processed.

[32] Using all our reporting shell companies' observations, we find that 31% of virgin and natural shells are being traded on the Pink Sheets whereas the respective number for development stage shells is 23%. Virgin and natural shells are companies that have as a sole business focus the acquisition of another regularly-operating company, have not started with any operations, and have a limited shareholder base when compared to development stage companies.

[33] In particular, the advantages of incorporating in Nevada include the following: there is no corporate income tax, no tax on corporate shares, no franchise tax, no gift tax, no stock transfer tax, no personal income tax, minimal reporting and disclosure requirements, only one director is required, and officers and directors are statutorily indemnified. While Delaware taxes corporate and personal income and lacks an indemnification statute, the primary advantage of incorporating in Delaware is the business-friendly history of established corporate case law. Specifically, regarding Delaware, Daines (2001) finds that Delaware corporate law improves firm value and facilitates the sale of public firms. He documents that Delaware firms receive significantly more takeover bids and are more likely to be acquired.

not publicize a clear definition for shell companies and looked unfavorably upon shell RMs, and prior to 1990 RMs were practically nonexistent. We find that reporting shell companies' survival time until a RM deal is 2.09 years when incorporated after 2006, 8.28 years when incorporated after 1990, and 20.24 years when incorporated after 1980. We suspect that the last two reported sub-samples exhibit longer mean hazard estimates since, as we have documented, shell RMs became popular after 2005. Reporting shell companies are able to continue trading beyond their mean survival time to conduct a RM. However, their stock price is likely to fall to a relatively low level.

VII. Performance of SPACs

Special Purpose Acquisition Funds (SPACs) are shell companies that issue shares in an IPO and then hold the cash collected in an escrow account until a potential suitor for a RM can be found. Because SPACs constitute a type of shell firm and are also used as vehicles for RMs, we analyze them in detail for comparison to ordinary shell firms. A SPAC has 18 months to find a target, or the fund is liquidated and the cash, less administrative expenses, is returned to the shareholders.[34] After an intended target is announced, the shareholders get to vote to either approve or reject the takeover. SPACs have grown in number from only one in 2003 to 87 in 2007-08. Over this period of time SPACs have raised more than $25 billion in 173 IPOs, comprising 16% of total new issues. Based on the dollar amounts raised, which average $156 million per firm, SPACs are far more popular among investors than ordinary shell companies.

SPACs have been analyzed by Jog and Sun (2007), Lewellen (2009), and Jenkinson and Sousa (2009). These papers divide the life cycle of a SPAC into four distinct categories. No

[34] Administrative expenses typically comprise five to seven percent of the total funds raised in the SPAC IPO (Feldman (2006)).

Target refers to the time after a SPAC IPO in which there is not yet an intended target for a RM deal. Target Announced refers to the time period after a SPAC has publicly announced its intended takeover target. Acquisition Completed is the time period after a SPAC has consummated a RM agreement. Acquisition Withdrawn is a possible category for a SPAC that has announced an intended target and then withdrawn its negotiations. This could happen either because the shareholders rejected the deal, or the SPAC management had a change of mind. Jog and Sun (2007) report that SPACs generate flat returns following a target announcement and marginally significant negative returns following an acquisition. Lewellen (2009) reports that firms in the post-announcement phase earn a marginally significant monthly four-factor alpha of 2%. In contrast, he reports that SPACs which have successfully completed an acquisition earn a four-factor alpha of -2% per month.

Because SPACs constitute a type of shell company that is used for RM transactions, and because the existing studies reach no uniform consensus, we thoroughly analyze SPAC performance for comparison with shell RMs. We obtain a data sample of 173 SPACs from PrivateRaise. Over the period January 2006 through April 2009 we are able to obtain return data on 111 of these firms. We conduct event studies of four distinct occurrences: the SPAC IPO, Target Announcement, Acquisition Completed, and Acquisition Withdrawn. Following Jog and Sun (2007) and Lewellen (2009), we adjust SPAC returns by subtracting the contemporaneous Russell 2000 index returns. Cumulative abnormal returns for each event are presented in Panel A of Table IX.

[Insert Table IX]

During the post-IPO phase, the SPAC funds in escrow earn a risk-free return and there is no information regarding a potential merger deal. Therefore, the SPAC shares are expected to hover around their trust liquidation value. Consistent with this, we find that the CARs following a SPAC IPO, whether two, five, or 30 days out, are flat and insignificant.

[Insert Figure 11]

The CARs surrounding a Target Announced (TA) event, however, are significantly positive. The five days surrounding the TA event have a CAR of 2.97% (*t*-statistic = 3.97) and the window [0, +30] has a CAR of 3.85% (*t*-statistic = 2.33). A graph of the TA CARs appears in Figure 11, where we see a distinct increase at the announcement date. We infer that shareholders on average greet the target announcement with approval.

Looking next at the Acquisition Completed (AC) event, we see flat returns at the announcement date followed by a significant negative return of -8.24% (*t*-statistic = -2.81) over the 31-day window [0, +30]. This negative post-acquisition return constitutes a reversal from the time of the target announcement and raises the question of why the shareholders appear dissatisfied with the consummation of merger deals that they have previously approved. A typical SPAC structure grants a large stake, including warrants, at minimal cost to managers and this stake becomes worthless in the event that no business combination is formed. Jenkinson and Sousa (2009) note that this structure creates the incentive for SPAC managers to close a deal at any cost and likely leads to many value-destroying acquisitions for SPAC shareholders. It is likely the case that investors who oppose an acquisition comprise a sizeable minority who simply "vote with their feet" by selling their shares. Indeed, Jenkinson and Sousa (2009) provide convincing evidence that SPAC founders and their affiliates, including the target company shareholders, buy up large amounts of SPAC shares, often at a premium, in the weeks leading up to an acquisition vote.

[Insert Figures 12 and 13]

A graph of the AC CARs appears in Figure 12. The trend in returns is clearly downward toward the end of the event window. To examine the longer-term performance of surviving firms, we display the post-event 18-month CARS in Figure 13, where we see a continued drop in returns. The buy-hold return for the 18-month window [+31, +390] is -75.7% (t-statistic = -8.30). On average the surviving firms turn in abysmal performance, similar to the negative long-run returns of surviving shell merger firms.

The last column of Panel A in Table IX reports the CARs for the Acquisition Withdrawn (AW) event. There are only five observations in our sample for this category, so the standard errors are relatively high. Nevertheless, we glean some interesting insight. The CAR for the 61-day event window surrounding AW is 23.35% (t-statistic = 1.97). Shareholders seem quite pleased when a proposed acquisition is withdrawn, indicating that the business combination was likely viewed as value-destroying.

For our final analysis, we follow the procedure of Lewellen (2009) and form four distinct portfolios of SPACs. Each portfolio is populated by firms that fall into one of the four stages in the life cycle of a SPAC outlined above. A SPAC is dropped from one portfolio and placed in another on the day a status-changing event occurs. This results in four time series of daily SPAC returns, and these time series are then regressed on the Fama-French four-factor model in equation (1). We note that there are insufficient observations in our sample to construct a continuous time series for Acquisition Withdrawn, so no results are reported for this category. Regression results are reported in Panel B of Table IX.

The first column of the table shows results for the portfolio comprised of all SPACs. A portfolio of SPACs earns a zero alpha, is slightly correlated with the market, and has negative momentum exposure. From the No Target results in the second column of the table, we see that the beta of 0.03 for these SPACs is close to zero, yet is highly significant. The alpha is zero, which Lewellen (2009), using monthly data, also reports for this category. For the category Target Announced, we find that the alpha of these SPACs is zero. However, Lewellen (2009) reports a marginally significant monthly alpha of 2.85% (*t*-statistic = 1.71) for these firms. The beta for this group of SPACs has increased to 0.22, indicating a heightened market sensitivity versus the No Target firms. The loadings on SMB and UMD are positive and significant. For the category Acquisition Completed, the beta has increased to 0.46, showing that the newly formed companies have much greater market exposure than the empty shell companies. The loadings on SMB and UMD are negative and significant for these firms. Finally, the alpha is a significant -0.11% per day (-2.31% per month) with a *t*-statistic of -2.39. This is largely in agreement with Lewellen (2009) who reports a monthly alpha for this category of -2.24%. This also is consistent with our negative post-acquisition CARs reported earlier.

[Insert Figure 14]

Overall, our analysis of SPACs reveals that the market reaction to SPAC RM agreements is negative, in contrast to shell RM returns which are positive and substantial. Figure 14 clearly illustrates the contrast between the two. SPAC investors have the comfort of knowing that their investment will be returned, less administrative expenses, if no acquisition is completed within 18 months. Yet, the returns to an acquisition are on average negative, showing a lack of reward for this future expectation. Hence, SPAC investors avoid downside losses during the target search phase at the price of sacrificing performance at the target acquisition. While shell firms offer no downside protection, their potential payoffs are substantial.

VIII. Conclusion

In the last five years, RMs have become an important alternative path for a private firm to achieve public status, and shell companies have provided the fuel for this growth. We examine the financial statements of a sample of trading shell firms and confirm that they have no operations and no assets. Yet, they have investors. Shell firms offer investors the hope of a reverse merger agreement and a significant payoff. However, only approximately half of all trading shell companies consummate a RM in a given year, and the stock price of most shell firms tends to decay over time.

We conduct an event study of shell firms that announce their intent to engage in a RM deal, and find that these firms earn an 11-day abnormal return of 35.7%. We also conduct an event study of shells which consummate a RM deal and find that these firms earn a three-month abnormal return of 48.1%, far surpassing the returns of other target firms in the takeover literature. We view this exceptional return as compensation to shareholders for shell stock illiquidity and the uncertainty of finding a reverse merger suitor.

We find that blockholders have holdings of 53% for the median firm. These blockholders do not tend to exit after lock-up periods expire, yet we observe a gradual decline in post-RM performance beginning about nine months after the RM. We find evidence suggesting that naked short-selling activity is occurring for at least one-fifth of the RM firms in the post-lock-up period, and this may help account for the observed decline in returns. Since the few exceptions to the ban on naked short-selling have recently been removed by the SEC, we believe that this activity will be more effectively curbed.

We contrast the reverse merger performance of shell firms with that of SPACs. Our hazard analysis reveals that the average time until a shell completes a RM is two years, about the same as a SPAC. SPACs afford investors a level of downside protection that ordinary shells do not offer; the typical shell stock loses half its value in about eight months. However, the potential return from an ordinary shell reverse merger is much greater than that from a SPAC acquisition. The literature shows, and we confirm, that SPACs generate tepid returns prior to a merger agreement, and negative returns upon consummation of a deal. Yet in terms of dollar volume, SPACs have been a far more popular investment vehicle than ordinary shells.

Shell companies present an interesting choice for investors as a potential alternative investment. These firms offer the intangible hope of a future RM agreement. The average returns surrounding a RM deal are indeed substantial, confirming that this hope is rational. The main apparent drawbacks of an investment in shells are the illiquidity of these stocks, and the risk of a long wait until a suitor can be found. The key to investing in shell companies would seem to be selecting those that are likeliest to engage in a RM in the shortest time. Based on the average rate of shell stock price decay and the average return surrounding a RM, we estimate that a typical shell would need to locate a suitor within five months to be profitable to an outside investor. Insiders who were issued shares have a lower cost basis and are likely more patient. Finally, we observe that the expected reward to investors from a shell RM is apparently sufficient to justify the recent growth in the number of shell companies alongside the growth in the RM industry as a whole.

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Table I
Shell Company Annual Descriptive Statistics

The table describes financial characteristics of 287 shell companies over the period 2006-2008. The financial data are from December 31 of each year. Panel A reports the mean values and Panel B reports the median values. Figures are in millions.

Panel A: Means	2006	2007	2008
Common Equity	-73.782	-177.780	-115.277
Shares Outstanding	30.134	40.989	30.134
Market Value of Equity	22.816	13.837	7.596
Total Assets	32.190	23.476	1.176
Sales	74.095	54.881	0.585
Net Income	0.619	1.442	-0.222
Cash	2.622	2.154	0.365
Capital Expenditures	0.551	0.295	0.171
R&D	0.060	0.011	0.011
Total Debt	7.485	4.754	0.128
Working Capital	4.809	4.519	0.128

Panel B: Medians	2006	2007	2008
Common Equity	-0.031	-0.107	-0.566
Shares Outstanding	8.322	9.165	9.102
Market Value of Equity	5.640	1.554	0.816
Total Assets	0.074	0.021	0.011
Sales	0.001	0	0
Net Income	-0.050	-0.054	-0.057
Cash	0.035	0.011	0.004
Capital Expenditures	0.001	0	0
R&D	0	0	0
Total Debt	0.005	0.001	0.025
Working Capital	-0.028	-0.025	-0.045

Table II
Shell Company Quarterly Descriptive Statistics

The table describes quarterly financial characteristics of 287 shell companies over the period 2006-2008. The financial data are from March 31, June 30, September 30, and December 31 of each year. Panel A reports the mean values and Panel B reports the median values. Figures are in millions.

Panel A: Means	3/06	6/06	9/06	12/06	3/07	6/07	9/07	12/07	3/08	6/08	9/08	12/08
Shares Outstanding	25.894	28.299	26.496	31.320	33.751	32.844	31.337	33.351	32.526	27.967	27.889	30.798
Total Assets	7.930	4.870	4.403	61.127	47.219	36.650	31.159	27.744	25.290	1.022	0.835	0.922
Sales	43.592	41.758	28.335	31.320	20.575	18.764	16.404	16.491	14.625	0.218	0.211	0.230
Net Income	0.245	0.708	0.311	0.495	0.155	0.372	0.151	0.152	0.250	-0.021	-0.068	-0.038
Cash	1.207	1.327	1.044	4.513	4.072	2.588	2.529	2.414	2.076	0.396	0.202	0.183
R&D	0.020	0.015	0.026	0.033	0.013	0.010	0.011	0.005	0.003	0.003	0.002	0.002
Total Debt	18.521	18.917	12.471	14.682	11.496	8.729	7.013	6.027	5.183	0.233	0.237	0.205
Working Capital	-0.330	-0.276	-0.832	9.667	7.492	6.258	4.770	5.192	4.669	-0.058	-0.133	-0.015

Panel B: Medians	3/06	6/06	9/06	12/06	3/07	6/07	9/07	12/07	3/08	6/08	9/08	12/08
Shares Outstanding	8.322	8.167	8.559	9.218	10.190	9.470	10.151	11.207	9.022	8.396	8.295	7.922
Total Assets	0.127	0.131	0.090	0.080	0.538	0.149	0.121	0.034	0.020	0.017	0.012	0.009
Sales	0	0	0	0	0	0	0	0	0	0	0	0
Net Income	-0.021	-0.012	-0.013	-0.016	-0.017	-0.018	-0.026	-0.016	-0.015	-0.010	-0.011	-0.009
Cash	0.015	0.018	0.020	0.036	0.034	0.025	0.026	0.016	0.012	0.012	0.006	0.004
R&D	0	0	0	0	0	0	0	0	0	0	0	0
Total Debt	0	0	0	0	0	0	0	0	0	0	0	0
Working Capital	-0.035	-0.032	-0.030	-0.025	-0.036	-0.040	-0.036	-0.035	-0.033	-0.042	-0.048	-0.041

Table III
Shell Firm Systematic Risk

The table displays the results from a regression of shell portfolio daily excess returns over 2006-2008 on the four-factor model given in equation (1). RMRF is the CRSP value-weighted market return in excess of the riskfree return, SMB is a size factor, HML is a book-to-market factor, and UMD is a momentum factor. *t*-Statistics are in parentheses.

Intercept	RMRF	SMB	HML	UMD	R^2
0.182	0.020	0.006	0.067	0.009	0.003
(4.50)	(0.70)	(0.10)	(0.83)	(0.19)	

Table IV
Reverse Merger Abnormal Returns

The table reports abnormal returns (ARs) and cumulative abnormal returns (CARs) for 298 shell reverse mergers in 2007-2008. Returns are in percent. The CAR *t*-statistic for day *n* is for the CAR spanning [-30, *n*]. The CAR standard error is based on the average of the cross-sectional return standard deviations from each event day.

Event Day	AR	AR *t*-statistic	CAR	CAR *t*-statistic
-30	0.08	0.06	0.08	0.06
-29	2.11	1.74	2.19	1.27
-28	1.27	0.76	3.46	1.46
-27	-0.76	-1.20	2.70	1.14
-26	0.19	0.48	2.89	1.25
-25	-0.21	-0.33	2.68	1.13
-24	0.69	0.66	3.36	1.30
-23	0.01	0.02	3.38	1.25
-22	1.30	0.97	4.67	1.56
-21	-1.15	-0.88	3.52	1.08
-20	-0.29	-0.44	3.23	0.98
-19	-0.10	-0.10	3.13	0.91
-18	1.04	1.31	4.17	1.18
-17	2.01	1.82	6.19	1.67
-16	0.22	0.26	6.41	1.69
-15	1.61	1.01	8.02	1.97
-14	1.42	1.26	9.44	2.23
-13	-1.17	-1.88	8.26	1.94
-12	0.33	0.53	8.60	2.01
-11	-0.16	-0.29	8.43	1.96
-10	0.49	0.31	8.93	1.96
-9	0.68	0.66	9.60	2.06
-8	0.24	0.26	9.84	2.07
-7	0.06	0.06	9.90	2.04
-6	-0.12	-0.15	9.78	1.99
-5	0.39	0.59	10.17	2.06
-4	0.68	0.36	10.85	2.08
-3	1.07	0.71	11.91	2.20
-2	1.88	1.60	13.80	2.50
-1	1.60	1.58	15.40	2.74
0	5.37	3.85	20.76	3.59
1	7.47	3.05	28.24	4.61
2	4.64	2.75	32.88	5.20
3	3.17	1.90	36.05	5.53
4	0.75	0.83	36.80	5.60
5	1.92	1.49	38.72	5.78
6	2.51	1.48	41.22	5.99
7	0.71	0.79	41.94	6.05
8	-0.44	-0.48	41.50	5.93
9	0.30	0.36	41.80	5.94
10	-0.22	-0.25	41.58	5.87
11	0.94	1.30	42.52	5.98
12	1.67	1.59	44.19	6.14
13	0.01	0.01	44.20	6.11
14	1.05	1.23	45.26	6.22
15	0.19	0.25	45.45	6.21
16	0.39	0.49	45.84	6.24
17	0.66	0.63	46.49	6.26
18	-0.89	-1.32	45.61	6.13
19	0.47	0.67	46.08	6.17
20	0.33	0.71	46.41	6.22
21	0.77	1.45	47.18	6.32
22	0.09	0.19	47.27	6.34
23	-0.36	-0.52	46.91	6.27
24	0.13	0.25	47.05	6.29
25	0.03	0.06	47.08	6.28
26	-0.28	-0.71	46.79	6.26
27	0.72	0.68	47.51	6.29
28	-0.04	-0.06	47.46	6.25
29	-0.05	-0.09	47.41	6.24
30	0.66	0.97	48.08	6.30

Table V
Reverse Merger Cumulative Abnormal Returns

The table reports the cumulative abnormal returns (CARs) for various event windows for 298 shell reverse merger deals that occurred during 2007-2008. Returns are in percent.

Event Window	CAR	*t*-statistic
[-30, -1]	15.40	2.74
[0, +30]	32.68	6.32
[-30, +30]	48.08	6.30
[-5, +5]	28.94	6.15
[-30, +60]	57.66	6.56

Table VI
Letter of Intent Cumulative Abnormal Returns

The table reports the cumulative abnormal returns (CARs) for various event windows for 49 shell reverse merger letter of intent announcements that occurred during 2007-2008. Returns are in percent.

Event Window	CAR	*t*-statistic
[-30, -1]	26.15	2.91
[0, +30]	27.82	2.85
[-30, +30]	53.97	4.07
[-5, +5]	35.70	3.72

Table VII
Ownership Structure Changes Surrounding a Reverse Merger

The table reports median annual values for various ownership variables one fiscal year before and one fiscal year after the reverse merger (RM) closing date. Number of blockholders is the number of any person or legal entity whose holdings exceed 5% of the total ownership structure, blockholder ownership is the total blockholders' percentage of ownership whereby we avoid all potential double counting when the CEO and the CFO are the same person, CEO holdings is the CEO's total ownership percentage (we incorporate any holdings of affiliated companies) and CFO holdings is the CFO's total ownership percentage (we incorporate any holdings of affiliated companies). The sample consists of shell companies that conducted a RM transaction within the period of 2006-2008. Data on RM deals is retrieved from DealFlow Media's database and from the PrivateRaise database. Data on the ownership characteristics is retrieved either from Item 12 of 10-K documents or, if missing, from the respective proxy statement DEF-14A. In columns 2 and 3 we present the median ownership characteristic values one fiscal year before and one fiscal year after the RM closing date, respectively. Wilcoxon two-sample median z-test statistics and associated *p*-values for the hypothesis that the two medians are equal are presented in column 4.

Panel A: All companies (n=154)

Ownership characteristic	Fiscal year before RM closing date	Fiscal year after RM closing date	Wilcoxon z-test statistic [*p*-value]
Number of blockholders	2	3	2.06 [0.04]
Blockholder ownership (%)	17	53	4.64 [0.00]
CEO holdings (%)	11	27	0.57 [0.57]
CFO holdings (%)	1	0	-5.10 [0.00]

Panel B: All companies with average volume greater than the sample median (n=142)

Ownership characteristic	Fiscal year before RM closing date	Fiscal year after RM closing date	Wilcoxon z-test statistic [*p*-value]
Number of blockholders	2	3	1.18 [0.24]
Blockholder ownership (%)	22	48	2.33 [0.02]
CEO holdings (%)	18	17	-1.09 [0.28]
CFO holdings (%)	0	0	-2.69 [0.01]

Panel C: All companies with average volume lower than the sample median (n=128)

Ownership characteristic	Fiscal year before RM closing date	Fiscal year after RM closing date	Wilcoxon z-test statistic [*p*-value]
Number of blockholders	2	2.5	1.42 [0.08]
Blockholder ownership (%)	8	65	4.05 [0.00]
CEO holdings (%)	6	35	1.87 [0.06]
CFO holdings (%)	1	0	-4.19 [0.00]

Table VIII
Hazard Analysis of Shell Reverse Mergers

The table reports the results of hazard model estimates on domestic shell reverse merger (RM) transactions. The sample period is 2006-2009 and the time interval is right-censored. The dependent variable for all model specifications is an indicator taking the value of 1 if the reporting shell company has conducted a RM transaction and 0 if it has not. The sample is composed of 144 shell firms with a date of incorporation on or after Jan 1, 2006. Of these, 83 firms engage in a RM transaction during 2006-2008. All companies that have not conducted any RM transaction are right-censored at 12/31/2008. The estimates in all model specifications are from Cox proportional hazard models. Qualitative (non-time varying) variables are the Exchange dummy taking the value of 1 if the reporting shell company is traded on the Pink Sheets and 0 if it is traded on any other exchange, the State dummy that takes the value of 1 if the reporting shell company is incorporated in either Delaware or Nevada and 0 if it is incorporated in any other state, and the Type dummy that is a categorical variable taking the value of 1 if the reporting shell company is a virgin shell, 2 if it is a natural shell, and 3 if it is a development stage shell. The quantitative variables are the following: Returns, Volume, Common Shares, Authorized Shares. Returns is the quarterly shell return, Volume is the average quarterly trading volume, Common Shares is the quarterly common outstanding shares, and Authorized Shares is the quarterly authorized shares. The quantitative variables span the time period 2006-2008. The table reports the hazard ratio estimates. *p*-Values based on chi-square statistics are shown in parentheses. * , ** and *** denote significance at the 0.10, 0.05 and 0.01 levels, respectively.

	I	II	III	IV
Returns		42.6	42.3	-90
		[0.299]	[0.305]	[0.99]
Volume			-82.8	-90
			[0.544]	[0.98]
Common Shares				13.5
				[0.99]
Authorized Shares				18.5
				[0.99]
Exchange dummy	0.403	0.043	0.047	0.1
	[0.035]**	[0.001]***	[0.001]***	[0.99]
State dummy	0.313	0.272	0.254	0.158
	[0.059]*	[0.027]**	[0.018]**	[0.065]*
Type dummy	0.798	1.234	1.298	0.512
	[0.061]*	[0.712]	[0.660]	[0.545]
Number of events/censored observations	62/82	20/124	18/126	7/137
Global Null Hypothesis (LR)	0.001	0.001	0.003	0.015

Table IX
SPAC Abnormal Returns

Panel A reports cumulative abnormal returns (CARs) for SPACs for four distinct events. SPAC IPO is the initial public offering of the SPAC. Target Announced refers to a SPAC announcement of a potential target for takeover. Acquisition Completed refers to the successful completion of a reverse merger transaction by the SPAC. Acquisition Withdrawn is the event where a SPAC withdraws from a previously announced takeover negotiation. Note that the [-5, +5] and [-2, +2] event windows for SPAC IPO are effectively left-censored at time zero. Returns are in excess of the Russell 2000 index. Panel B presents regression results from the Fama-French four-factor model in equation (1). Time series portfolios are assembled over the sample period based on the four phases in the life cycle of a SPAC. No Target refers to the time period after an IPO when the SPAC has not yet found a takeover target. *t*-Statistics are in parentheses. Newey-West standard errors are computed for the regression *t*-statistics. All returns are in percent.

Panel A: CARs

Event Window	SPAC IPO	Target Announced	Acquisition Completed	Acquisition Withdrawn
[-30, +30]		3.85 (1.72)	-5.02 (-1.27)	23.35 (1.97)
[-30,-1]		0.01 (0.00)	3.26 (1.22)	6.40 (0.72)
[0, +30]	1.05 (1.06)	3.85 (2.33)	-8.24 (-2.81)	16.95 (2.13)
[-5, +5]	0.00 (0.01)	2.55 (2.60)	0.30 (0.10)	9.36 (1.70)
[-2, +2]	0.00 (0.02)	2.97 (3.97)	1.56 (0.56)	5.87 (1.53)
Num. Obs.	111	82	54	5

Panel B: Portfolio Regressions

	All SPACs	No Target	Target Announced	Acquisition Completed	Acquisition Withdrawn
Intercept (Alpha)	-0.01 (-0.60)	0.00 (-0.18)	0.02 (0.55)	-0.11 (-2.39)	*
RMRF	0.19 (10.05)	0.03 (3.15)	0.22 (7.73)	0.46 (10.44)	
SMB	0.04 (0.87)	0.05 (1.25)	0.16 (1.98)	0.06 (0.58)	
HML	-0.09 (-1.38)	-0.02 (-0.37)	0.07 (0.72)	-0.31 (-2.18)	
UMD	-0.09 (-2.46)	0.01 (0.53)	0.10 (2.27)	-0.23 (-3.00)	
Adj. R^2	0.332	0.012	0.077	0.339	
N	111	111	82	54	5

* There are insufficient observations to conduct a regression analysis for this category.

Figure 1
Number of Shell Reverse Mergers

The figure shows the number of shell reverse mergers by year. The data are from DealFlow Media's Reverse Merger Report.

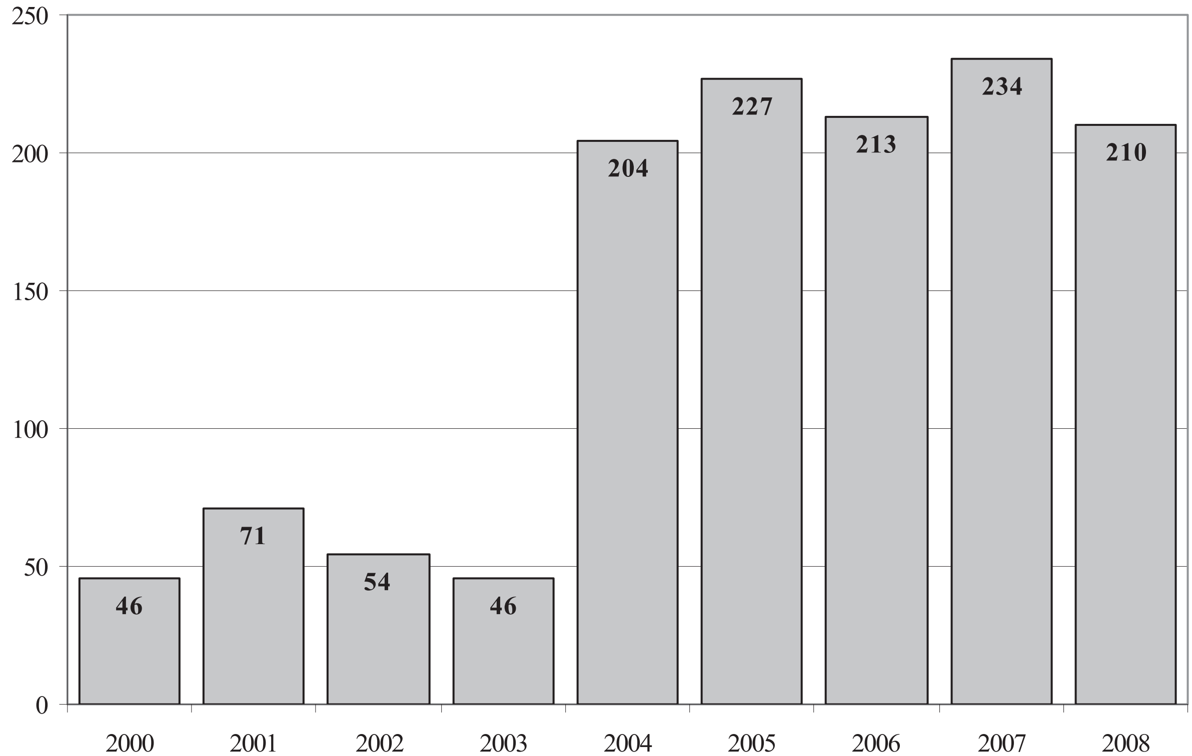


Figure 2
Number of IPOs, Penny Stock IPOs, Reverse Mergers, and Sellouts

The figure shows the number of each type of public offering over the period 1990-2008. The number of reverse mergers shown in this graph includes both shell and non-shell reverse merger deals. The data are from Thomson SDC and DealFlow Media.

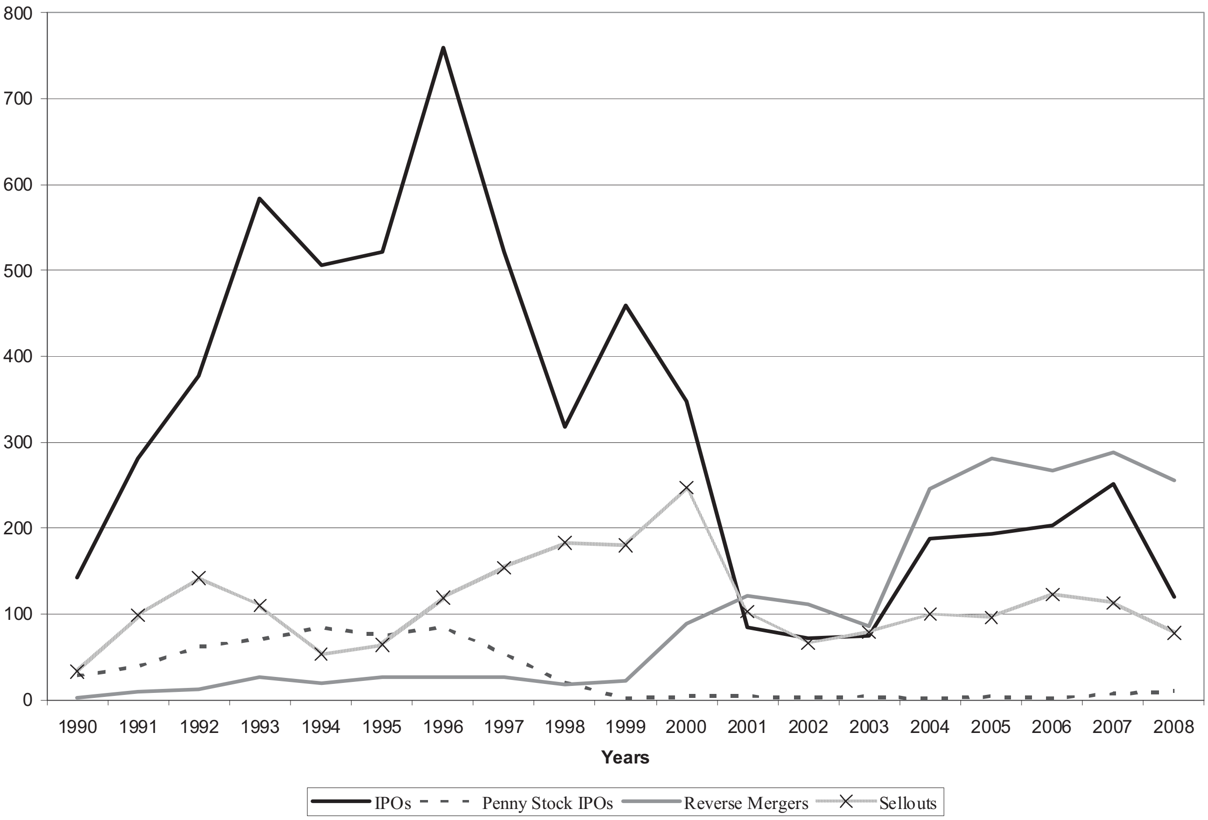


Figure 3
Distribution of Shell Firm Share Prices

The figure shows the distribution of shell firm average share prices. The median share price is $0.34.

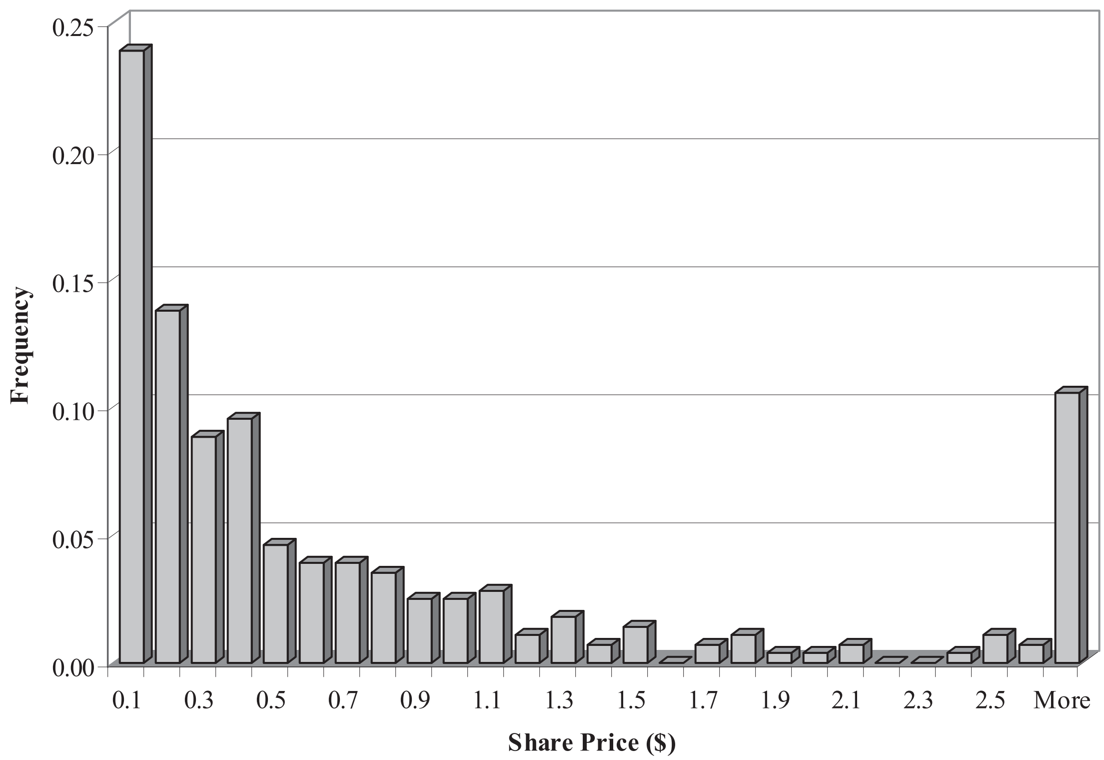


Figure 4
Distribution of Shell Quoted Spreads

The figure shows the distribution of shell firm quoted half spreads, where the spread is expressed as a percentage of the midquote. The median half spread is 22.3%.

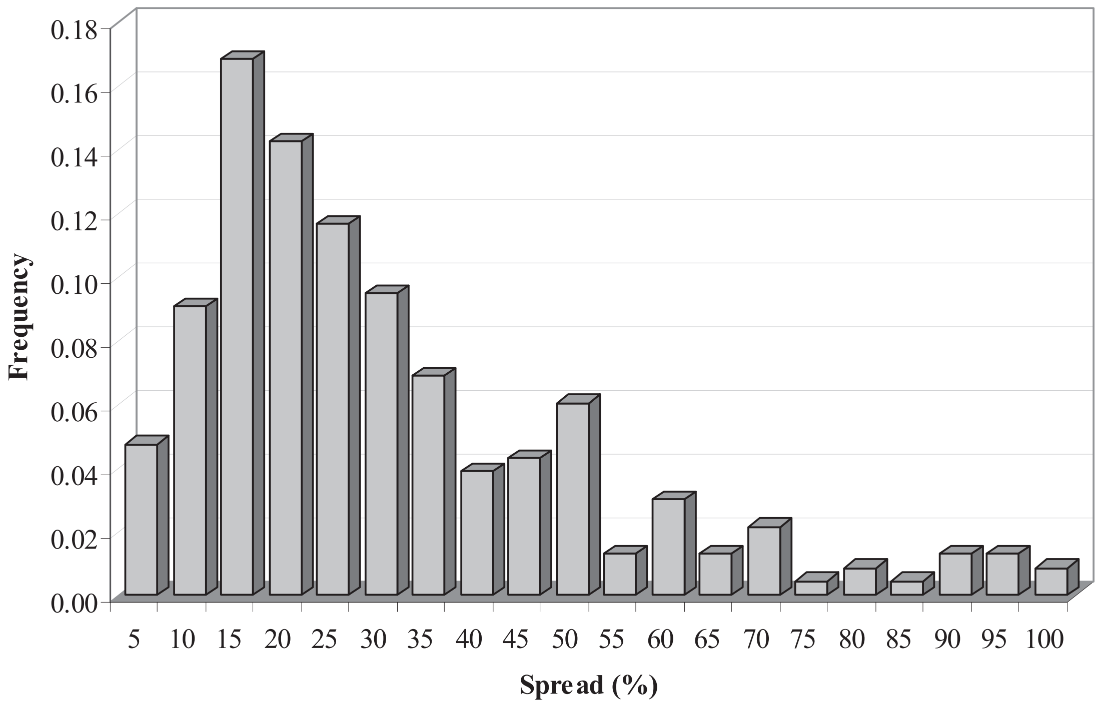


Figure 5
Shell Firm Daily Returns

The figure shows the average daily return of shell companies over the sample period January 1, 2006, through December 31, 2008. The shell returns are computed from the midpoint of the daily closing bid-ask spreads.

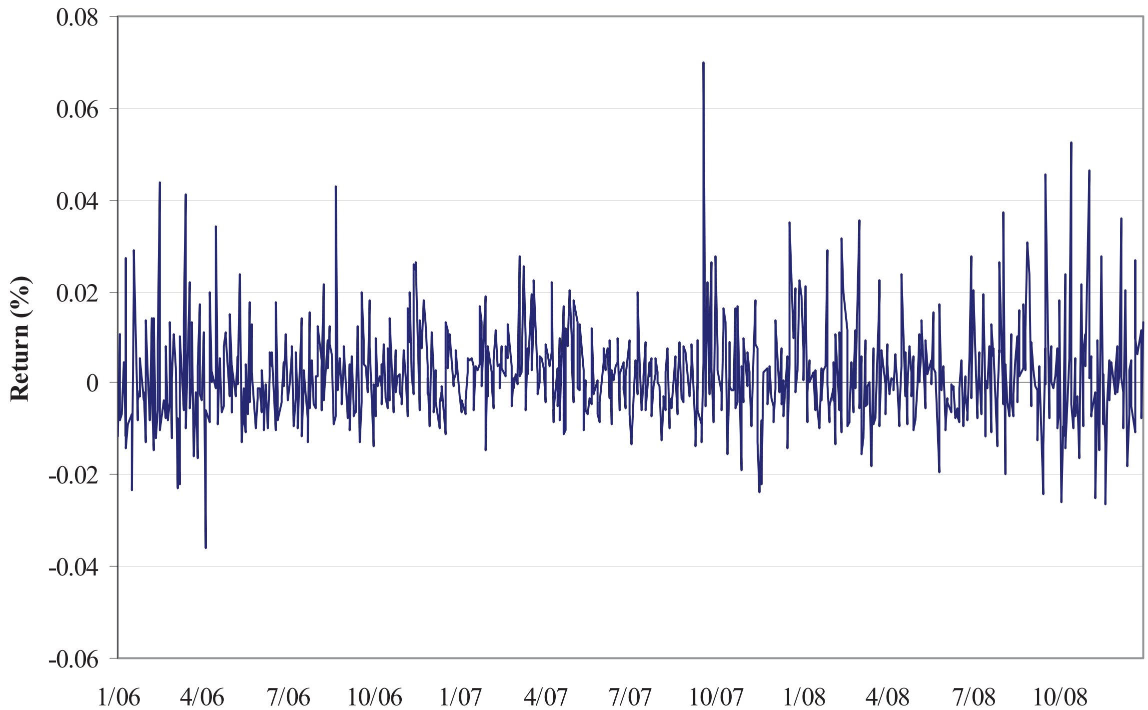


Figure 6
A Typical Shell Firm Stock

The figure shows the daily stock price of a shell company over the period April 6, 2006, through December 31, 2008. The ticker symbol of the displayed shell firm is WTMK.

Figure 7
Reverse Merger Abnormal Returns

The figure shows abnormal returns (ARs) in event time from 298 reverse mergers taking place during 2007-2008. The ARs are displayed for the period spanning 30 days prior to the merger consummation to 30 days after. The expected daily return is zero, and hence all returns are treated as abnormal.

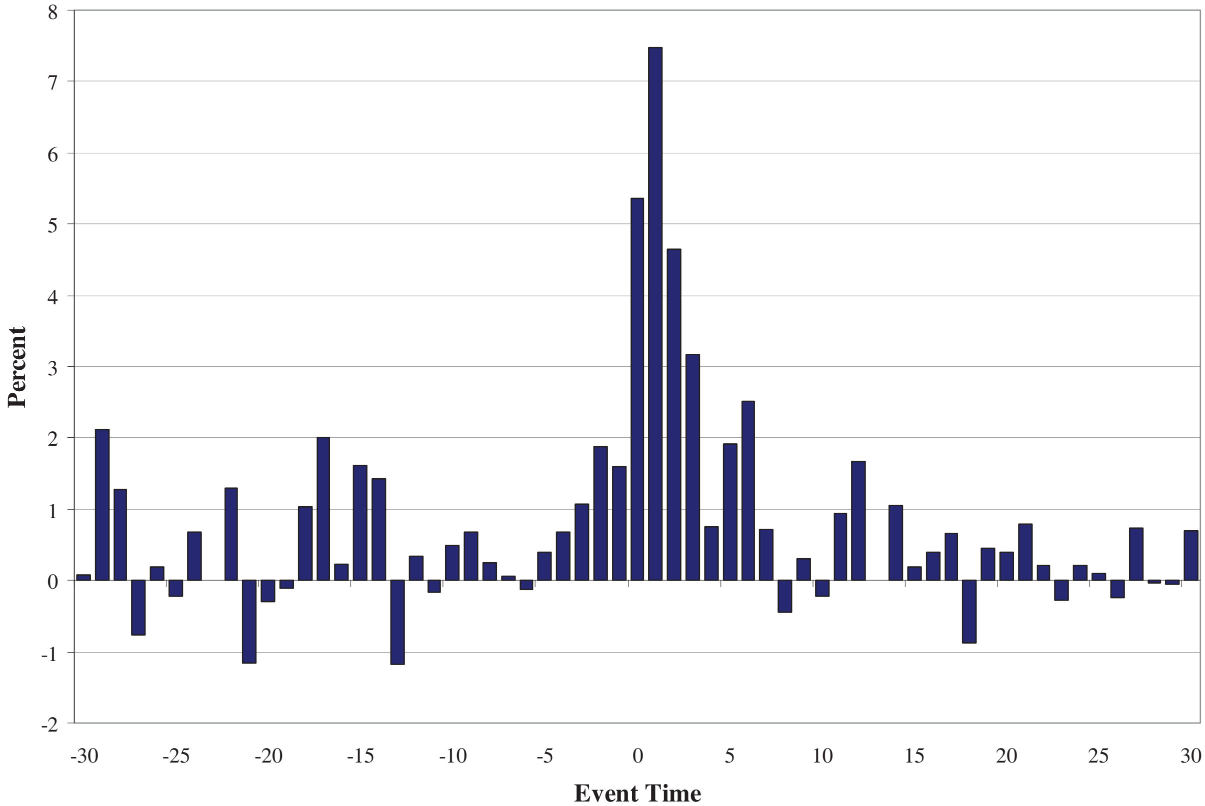


Figure 8
Reverse Merger Cumulative Abnormal Returns

The figure shows the average cumulative abnormal returns (CARs) for 298 reverse mergers taking place during 2007-2008. The CARs are displayed for the period spanning 30 days prior to the merger consummation to 30 days after. The expected daily return is zero, and hence all returns are treated as abnormal.

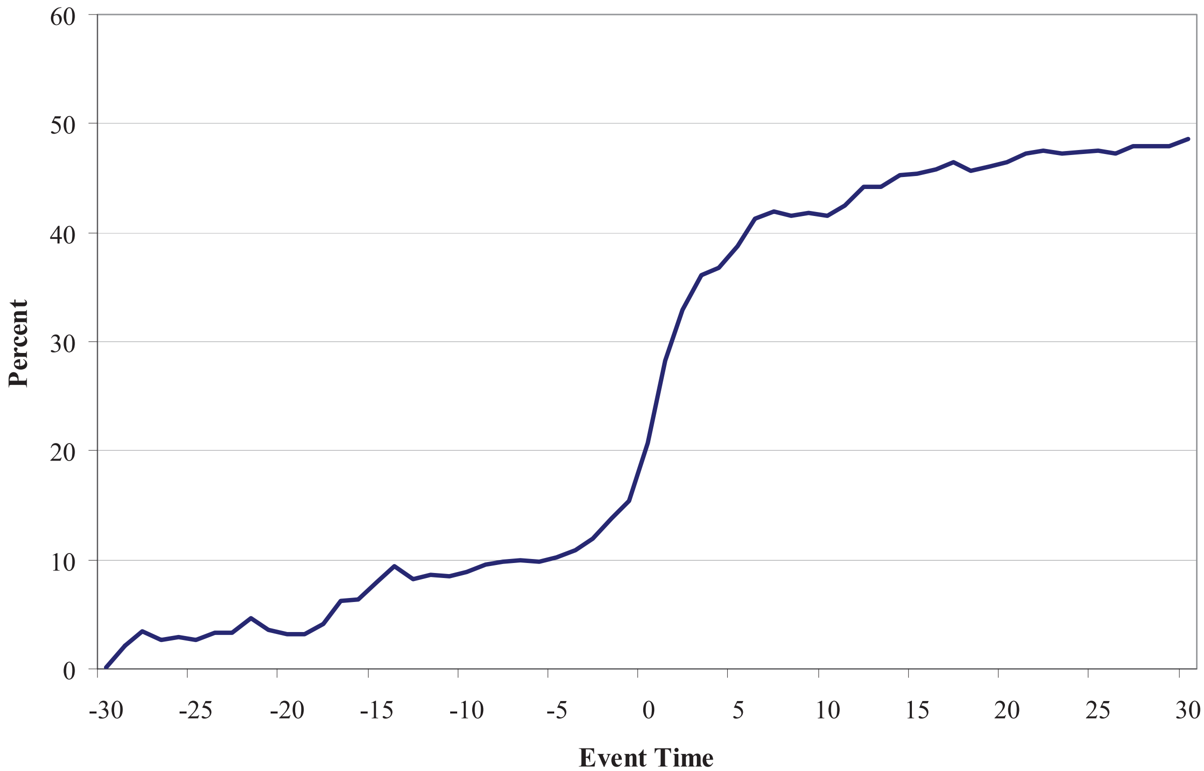


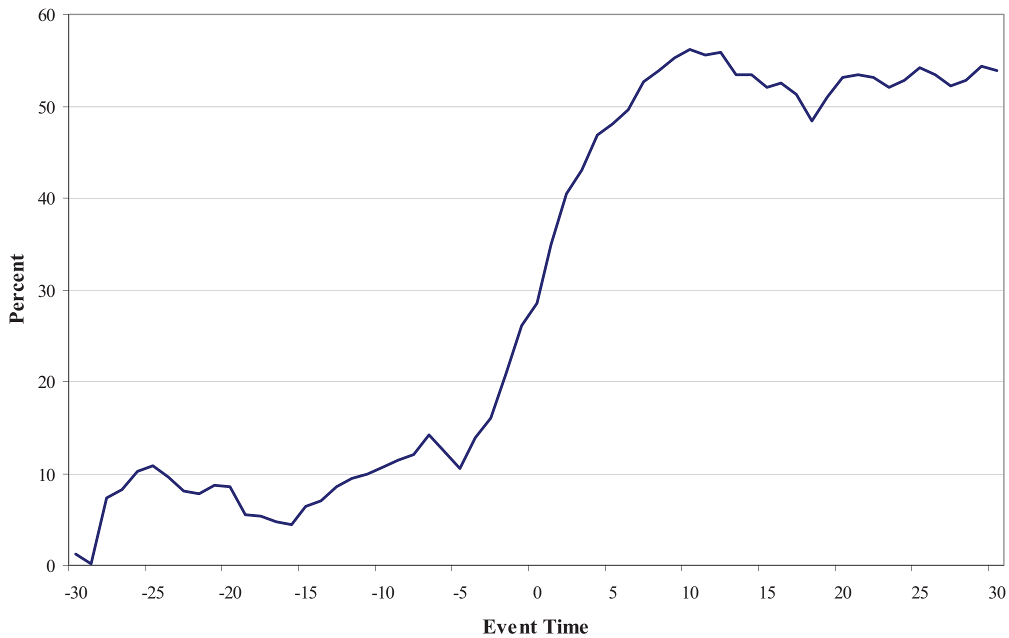
Figure 9
Reverse Merger Long-Run Performance

The figure shows the average cumulative abnormal returns (CARs) for 298 shell reverse mergers taking place during 2007-2008. The CARs are displayed for the 20-month period spanning 30 days prior to the merger consummation to 390 days after. The expected daily return is zero, and hence all returns are treated as abnormal.

Figure 10
Letter of Intent Firm Cumulative Abnormal Returns

Panel A shows the average cumulative abnormal returns (CARs) for 49 reverse merger letter of intent announcements taking place during 2007-2008. Panel B shows the CARs for 49 reverse merger transactions following an announced letter of intent. The CARs are displayed for the period spanning 30 days prior to the event to 30 days after. The expected daily return is zero, and hence all returns are treated as abnormal.

Panel A: Letter of Intent Announcement CARs



Panel B: Reverse Merger CARs

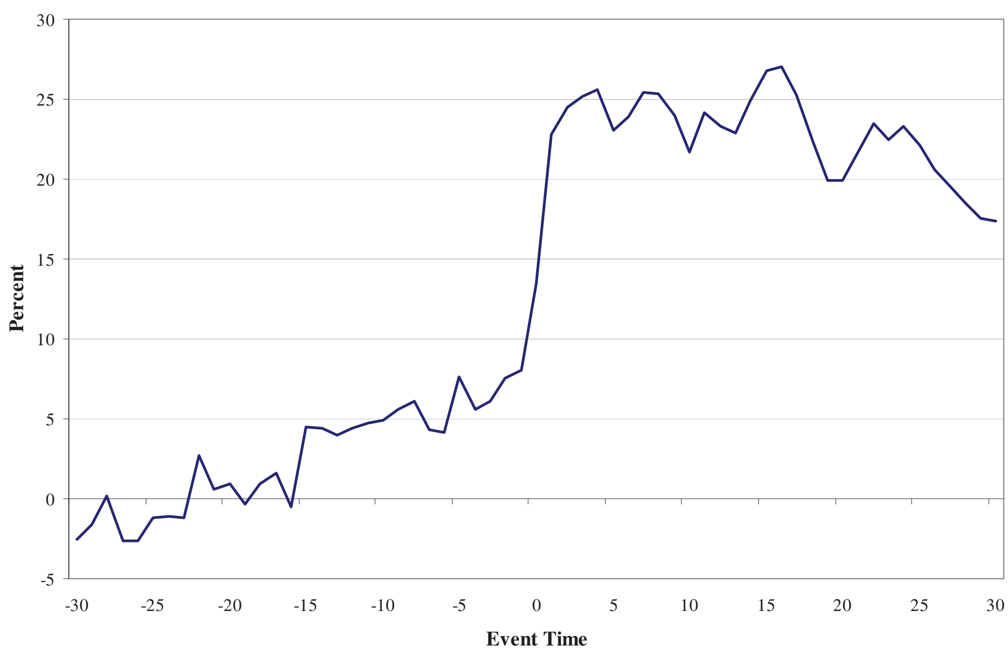


Figure 11
SPAC Cumulative Abnormal Returns from the Target Announcement

The figure shows the CARs from the SPAC announcement of an intended takeover target. The sample period is January 2006 through April 2009. There are 82 SPAC target announcements in the sample. CARs are returns in excess of the Russell 2000 index.

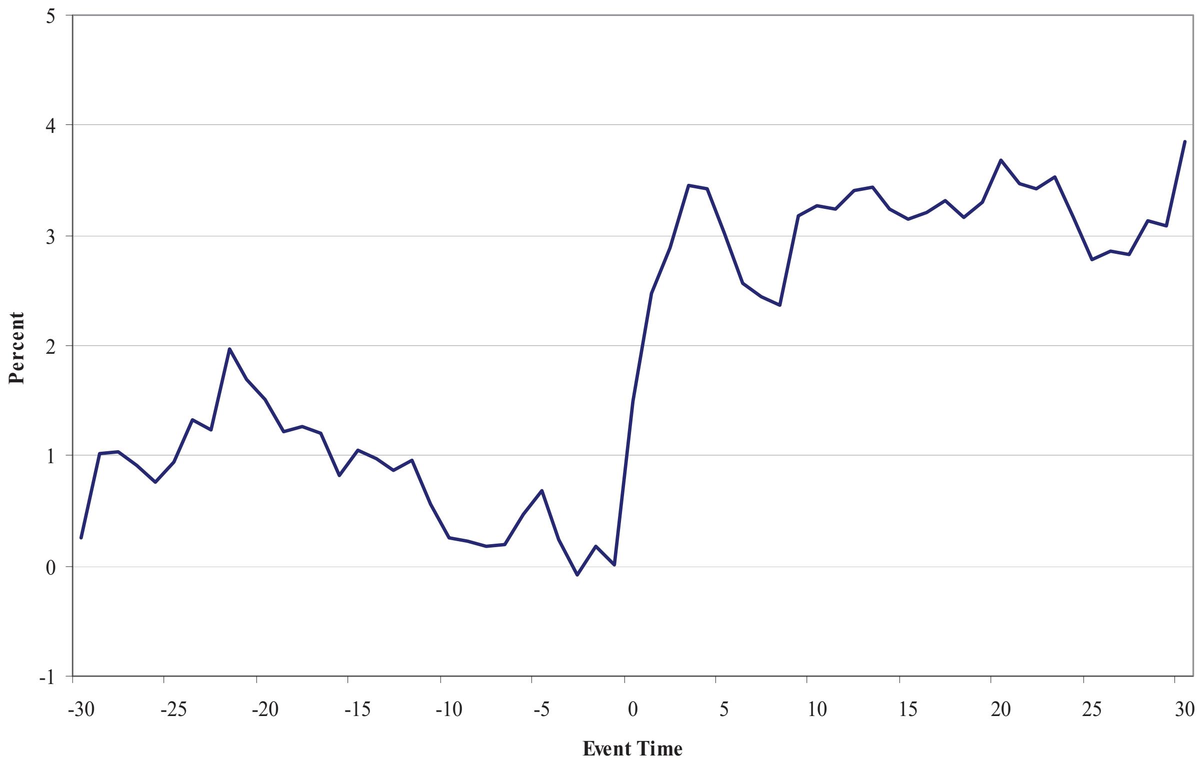


Figure 12
SPAC Cumulative Abnormal Returns from the Target Acquisition

The figure shows the CARs from the SPAC acquisition of a takeover target through reverse merger. The sample period is January 2006 through April 2009. There are 54 SPAC reverse mergers in the sample. CARs are returns in excess of the Russell 2000 index.

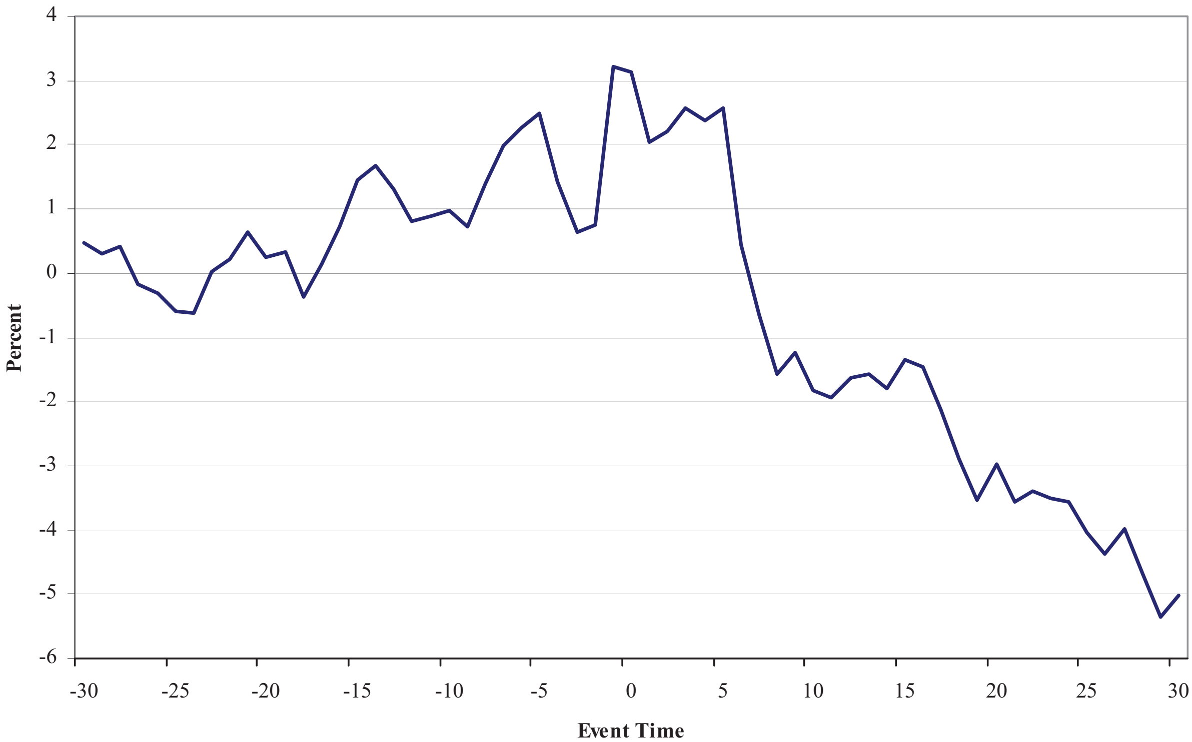


Figure 13

SPAC Long-Run CARs from the Target Acquisition

The figure shows the long-run CARs from the SPAC acquisition of a takeover target through reverse merger. The CARs are displayed for the 20-month period spanning 30 days prior to the merger consummation to 390 days after. The sample period is January 2006 through April 2009. There are 54 SPAC reverse mergers in the sample. CARs are returns in excess of the Russell 2000 index.

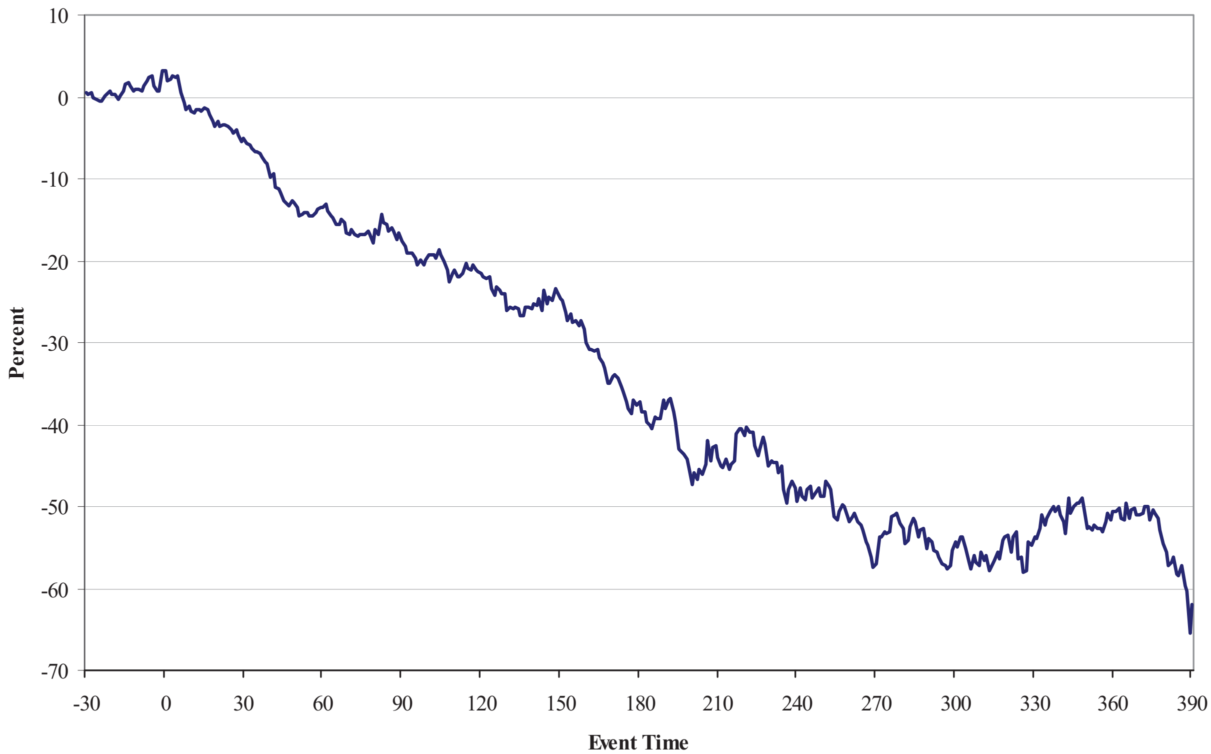


Figure 14
Comparison of Reverse Merger CARs: Shells versus SPACs

The figure shows the cumulative abnormal returns from 298 shell reverse mergers and 54 SPAC reverse mergers.