Corporate Acquisitions, Diversification, and the Firm's Lifecycle

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Abstract

Agency theories predict that firms acquire and diversify through acquisitions as they grow older and exhaust their internal growth opportunities, and that they do so for the benefit of managers rather than shareholders. In contrast, we find that acquiring firms are firms with better growth opportunities and performance irrespective of their lifecycle stage. While younger firms acquire more than mature firms, the acquisition rate follows a u-shape through firms' lifecycle and this u-shape is stronger after accounting for economic conditions. Mature firms do not diversify more than young firms. Using average stock-price reactions, there is no evidence that diversifying acquisitions destroy wealth, whether the acquirer is young or mature, but non-diversifying acquisitions of public firms are associated with wealth losses for shareholders when paid for with equity for both young and mature firms. No other type of acquisitions is associated with wealth destruction for young or mature firms.

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1. Introduction

Existing theories of the role of acquisitions and diversification in the lifecycle of firms offer two very different views. Agency theories predict that firms make wealth-destroying acquisitions and diversify as their cash flow outstrips their internal growth opportunities and management becomes more entrenched so that it pursues growth at the expense of shareholders (e.g., Mueller (1973) and Jensen (1986, 1993)). With these theories, firms' acquisition rate is expected to be higher when they are older, older firms are more likely to make diversifying acquisitions, and the acquisitions of older firms do not create value for shareholders. Neo-classical theories predict instead that firms acquire to make the best use of their valuable scarce assets (see Maksimovic and Phillips (2013) for a review). As a result, acquisitions, including diversifying ones, create value because assets move to the firms best able to use them. To the extent that firms go public to be in a better position to exploit their scarce assets by having easier access to external finance, younger firms are expected to actively acquire and diversify with the neo-classical theories. However, as growth opportunities are used up, firms with valuable scarce assets may acquire and diversify to keep making optimal use of these assets, so that these theories can predict an increase in the acquisition rate and in diversifying acquisitions as firms age. With these theories, acquisitions create wealth throughout the life-cycle of firms.

In this paper, we investigate whether firms' acquisition rate changes with their age and the extent to which firms' acquisition rate through their lifecycle supports the predictions of the agency theories and of the neo-classical theories. As far as we know, no other study has examined the acquisition behavior of firms through their lifecycle. After excluding the firms that do not meet our data requirements, we have a sample of 7,506 firms that have an IPO in the US from 1975 to 2008. Using this sample, we find that, within cohorts, the acquisition rate of young firms, which are firms that are less than four years from their IPO, is higher than the acquisition rate of other firms. However, as shown in Figure 1, the acquisition rate of firms follows a u-shape through their lifecycle: the acquisition rate falls sharply early on, stays relatively constant for a number of years, and then increases. When we examine separately acquisitions

within a firm's industry and diversifying acquisitions, we find that firms diversify throughout their lifecycle and that mature firms do not make more diversifying acquisitions than young firms.

Figure 1 does not account for cohort effects and for economic condition effects. Hence, the relation between the acquisition rate and a firm's lifecycle stage might be driven by these effects. For instance, it could be that on average economic conditions are better when we observe firms from our IPO cohorts being more than fifteen years old, so that these firms make more acquisitions not because of their lifecycle stage but because of economic conditions. We estimate regressions that account for these effects. When we do so, we find a stronger u-shape pattern for the acquisition rate. We also show that the lifecycle effects remain when we control for firm-specific characteristics. The fact that the u-shape becomes stronger is explained by the extremely high sensitivity of the acquisition rate of young firms to economic conditions. Considering only diversifying acquisitions, we find evidence of a u-shape pattern for these acquisitions as well, but the pattern is attenuated compared to the pattern for all acquisitions.

The pattern shown in Figure 1 could be consistent with older firms making acquisitions and diversifying because they have insufficient growth opportunities in their industry. To examine that possibility, we investigate whether the determinants of the acquisition rates of young and mature firms differ using firm-level regressions. We use Tobin's q, measured as the ratio of the market value of the firm's assets to their book value, as our measure of growth opportunities. If firms were more likely to make acquisitions because they exhaust their growth opportunities as they mature, we would expect mature firms that make acquisitions to have a lower q than the firms that do not make acquisitions. This is not the case. We show that the average q of acquiring firms is higher than the average q of non-acquiring firms through the lifecycle and that the acquisition rate increases with q whether a firm is young or mature.

Our evidence of a positive relation between a firm's acquisition rate and its Tobin's q is supportive of the neo-classical view of acquisitions. The neo-classical view of acquisitions is that they reallocate corporate assets to more productive uses. When assets are understood broadly to include intangible assets that are on firms' balance sheets as well as assets that are not, such as organizational knowledge and

skills, high q firms are expected to have more valuable assets and hence to acquire more. In this vein, Jovanovic and Rousseau (2002) develop a q-theory of mergers. In their theory, investment can take place through capital expenditures as well as through acquisitions. High q firms make acquisitions because they have greater productivity that they can transfer to the acquired firm. In our sample, younger firms have sharply higher q's than more mature firms, so that they are expected to acquire more than mature firms. With this theory, we would also expect better-performing firms to make more acquisitions (Warusawitharana (2008)). An alternative theory, advanced by Rhodes-Kropf and Robinson (2008) predicts that firms acquire firms with complementary assets when ownership of these assets by one firm reduces problems arising from incomplete contracting. We would expect such assets to be more likely to be intangible assets. High q firms have generally more intangible assets, so that we would expect higher acquisition rates by high q firms.

With the agency theories, more mature firms diversify because they have poor growth opportunities and high cash flow. We examine whether the determinants of whether a firm makes a diversifying acquisition change with the firm's lifecycle stage. Strikingly, firms are more likely to make diversifying acquisitions because they have a high Tobin's q. An increase in Tobin's q has more of an impact on the likelihood that a firm will make a diversifying acquisition than that it will make an acquisition in its own industry. Such a result is hard to reconcile with agency theories. With agency theories, mature firms with higher cash flow should diversify more. We do not find support for this prediction. Our results are more consistent with neo-classical theories than with agency theories. For instance, Maksimovic and Phillips (2002) develop a model of diversification where a firm's valuable scarce asset is managerial talent. When managerial talent can be applied across several industries, it is optimal for the firm to be diversified and to equate the marginal product of managerial talent across activities. Firms with high managerial talent would, everything else equal, have a high q and acquire more.

Agency theories of acquisitions and diversification have sharply different implications about the impact of acquisitions and diversification on shareholder wealth from the neo-classical theories. There is a vast literature on the stock-price impact of acquisitions, but this literature does not consider separately

the impact of acquisitions of mature firms and of young firms (see Betton, Eckbo, and Thorburn (2008) for a review). If acquisitions by older firms are not efficient, we would expect the market to react negatively to these acquisitions. In contrast, with neo-classical theories, firms make acquisitions because they create shareholder wealth, so that we would expect the market to react positively to acquisitions. While the market reacts positively to acquisitions of private firms and subsidiaries, the evidence for acquisitions of public firms is mixed. The market reacts negatively to acquisition of public firms paid for with equity whether undertaken by a young or a mature firm. For acquisitions of public firms paid for with cash, the market reacts positively for acquisitions by young firms and there is no significant stock-price reaction to acquisitions by mature firms. Surprisingly, none of the negative returns can be explained by diversifying acquisitions. Instead, they are due to acquisitions firms make within their industry. In other words, diversifying acquisitions do not appear to destroy wealth, but related acquisitions of public firms paid for with equity do. This evidence cannot be explained by the agency theories mentioned at the beginning of this section. These theories predict that wealth is destroyed by diversifying acquisitions by mature firms, which is not the case in our sample.

A concern with our results is that Tobin's q could proxy for misevaluation. A recent literature focuses on the role of misvaluation in acquisition decisions by firms. With that literature, a high Tobin's q for a firm could be evidence that the firm is overvalued rather than evidence that a firm has good growth opportunities. Firms could time their IPOs to when the market is likely to overvalue them (see Ritter and Welch (2002) for a review of theories and evidence) and engage in acquisitions using their overvalued equity. Shleifer and Vishny (2003) provide a model of acquisitions made by overvalued firms and researchers have found evidence for a role of overvaluation in acquisition decisions and outcomes (e.g., Dong, Hirshleifer, Richardson, and Teoh (2006), Rhodes-Kropf, Robinson, and Viswanathan (2005)). Overvalued firms are expected to make acquisitions paid for with equity. However, our evidence shows that overvaluation cannot explain our findings. First, our results hold controlling for the merger wave of the late 1990s that is associated with overvaluation. Second, we find that cash is the preferred mode of payment for both young and mature firms. Third, the acquisitions that destroy wealth the most in our

sample are related acquisitions of public firms, while the overvaluation theory would predict that unrelated acquisitions destroy wealth in that firms that are overvalued are much more likely to find acquirers outside of their industry since other firms in the industry are likely to be also overvalued.

Even though our focus is quite different from theirs, we build on the contributions of recent papers that emphasize the high acquisition rate of young firms. In an important contribution, Celikyurt, Sevilir, and Shivdasani (2010) show that firms are very active acquirers immediately after their IPO using a sample of IPOs from 1985 to 2004. They find young firms to be more active in acquisitions than firms that are more than 5 years from their IPO. In contrast to their work, we follow firms through their lifecycle controlling for cohort and calendar year effects, investigate theories that pertain to mature firms, and compare the determinants of acquisition rates for the same firms when they are young and mature.

A number of recent papers focus on acquisitions by firms shortly after their IPO. These papers differ in their interest from our paper as we are focused on acquisitions and diversification through a firm's lifecycle. Brau and Fawcett (2006) survey CFOs and learn that "the primary motivation for going public is to facilitate acquisitions." Hsieh, Lyandres, and Zhdanov (2011) use a much longer sample to show the acquisition rate of IPOs and how it relates to merger waves. The fact that they find that high IPO intensity precedes merger waves suggests that the high acquisition rate of IPO firms may be related to the degree of activity in the M&A merger market. Our evidence shows that this is the case. Hovakimian and Hutton (2010) explore how being public helps a firm undertake acquisitions within three years of the IPO. Among other results, they find that IPO firms benefit from having highly valued public stock as a means of acquisition currency. Brau, Couch, and Sutton (2011) find that IPO firms that make acquisitions underperform in the long-run relative to firms that do not. Wiggenhorn, Gleason, and Madura (2007) examine acquisitions made during the first year following an IPO. They show that firms that make such acquisitions do not have poorer long-term performance than other IPO firms and that the stock market reacts positively to such acquisitions. Gao, Ritter, and Zhu (2012) argue that in recent years it has been important for firms to grow fast and that, as a consequence, IPO firms are more likely to acquire and be acquired. They find evidence supportive of their prediction. Alimov and Mikkelson (2008) examine the

investment behavior of firms that go public in favorable market conditions (defined as conditions where there is a high rate of firms going public and high valuations), and find that firms that go public in these conditions tend to spend more on acquisitions.

The paper proceeds as follows. In section 2, we discuss in greater detail the predictions of the agency and neoclassical theories and outline our empirical approach to test these predictions. In section 3, we describe the construction of our sample of IPOs and of the acquisitions made by these firms. In section 4, we show evidence on the rate of acquisition of firms as a function of their age as public firms. In section 5, we show how the acquisition behavior of young firms differs from the acquisition behavior of mature firms. In section 6, we estimate life-cycle, IPO cohort, and economic condition effects on the acquisition rate. In section 7, we investigate whether life-cycle effects hold when we control for firm characteristics and whether the relation between the acquisition rate and firm characteristics depends on a firm's life-cycle stage. In section 8, we examine whether the value created by acquisitions depends on whether a firm is young or mature. We conclude in section 9.

2. Hypotheses and tests

In this section, we present the main hypotheses we test and the approaches we use to test them. As we discussed in the introduction, we focus on two broad sets of theories on the role of acquisitions and diversification. We call them the agency theories and the neo-classical theories. We review briefly these theories in this section and draw out testable implications.

2.1. The agency theories

With the agency theories, firms have valuable growth opportunities early in their life. However, eventually, management becomes entrenched enough to grow the firm beyond the growth that can be achieved by exploiting the firm's existing growth opportunities as long as resources are available to do so (Jensen (1986)). This evolution happens because the firm's stock of valuable growth opportunities tends to fall over time as firms use their initial growth opportunities and generally do not succeed in replacing

all of them. With these theories, firms eventually acquire and diversify because of a lack of growth opportunities or because doing so has other benefits for management. The agency literature generally views diversification as creating inefficiencies because of the difficulty of managing firms in different industries. However, diversification benefits management because it decreases uncertainty (Amihud and Lev (1981)) and acquisitions enable the firm to keep growing, so that management is in charge of a firm that becomes larger and controls more resources (Mueller (1973)). Acquisitions and diversification can also entrench management (Shleifer and Vishny (1989)). Larger firms are considered to have more perks for management and higher compensation. If management did not diversify, it would have to return cash to shareholders instead, so that the firm would grow less or possibly even shrink. As a result, diversification is associated with agency problems and firms with more agency problems are more likely to diversify (Denis, Denis, Sarin (1997)).

With the agency theories, firms acquire and diversify later in life as they run out of growth opportunities and management is reluctant to pay out the firm's cash flow to shareholders. Therefore, firms acquire and diversify when they have poor growth opportunities. They are more likely to acquire and diversify when they have high cash flow (Jensen (1986)). Acquisitions driven by managerial objectives destroy firm value (Morck, Shleifer, and Vishny (1990)). To the extent that such acquisitions tend to be made by mature firms, acquisitions by such firms destroy shareholder wealth, and this is especially the case for diversifying acquisitions.

2.2. The neo-classical theories

The heart of the neo-classical view is that firms have valuable scarce assets that they take advantage of through acquisitions and diversification. It follows that the firms that undertake acquisitions are more valuable and better performing. This means that high q firms acquire and a higher q leads firms to acquire more. To the extent that younger firms have a higher q ratio, we would expect younger firms to be active acquirers. It also follows that acquisitions increase shareholder wealth.

The reasons why acquisitions and diversification increase shareholder wealth differ across models. Maksimovic and Phillips (2002) develop a model where firms own a scarce asset that has decreasing returns to scale in an industry. As a result, firms will find it optimal to invest in other industries to maximize the value of that asset when it has a higher return in other industries. Within an industry, a firm may find it more efficient to acquire production capacity through acquisitions rather than building new plants or increasing the size of existing plants. Alternatively, a firm may have valuable scarce assets that can be used profitably in multiple industries or assets that can be best exploited when their output is combined with the output of other industries. These various approaches imply that value is created as firms acquire and diversify because that is the way that a firm best exploits valuable scarce assets, including growth opportunities.

Other approaches predict that diversification can create value for shareholders. One approach is that being diversified is by itself a source of value because a diversified firm's internal capital market enables it to allocate capital more efficiently than if its divisions were stand-alone firms forced to access external markets (Stein (1997)). This internal capital market enables firms to exploit information that would be difficult to convey to outsiders, so that it can make it possible to invest in projects that would be hard to finance externally. The internal capital market can also enable firms to stop activities that have become unprofitable more efficiently. One more benefit of internal capital markets is that they make it possible for firms to mitigate the impact of unexpected shocks to the supply of credit as a diversified firm can use cash flows generated by segments that are not growing to invest in segments that should optimally grow (Seru (2014), Kuppuswamy and Villalonga (2012)). Another approach that predicts that diversification creates value is that firms may not know their comparative advantage precisely. They may have assets they know are valuable but not be sure how to best use these assets. In such a situation, a firm may invest in different activities and discard activities when it finds that others can own these activities more efficiently (Matsusaka (2001)). Finally, in Gomes and Livdan (2004), firms diversify to take advantage of economies of scope and because "diversification allows a mature, slow-growing firm to explore attractive

new productive opportunities." Their model predicts that firms make acquisitions when they are mature rather than when they are young.

With the neo-classical view, we would expect firms with a lower Tobin's q to invest less, where investment can take the form of capital expenditures and acquisitions. Hence, everything else the same, we would expect higher q firms to acquire more. If Tobin's q falls with age, we would expect mature firms to acquire less than young firms. However, some of the models we have discussed imply that firms make diversifying acquisitions when some scarce assets become underemployed. To the extent that these assets become underemployed when firms become more mature, a u-shape pattern of acquisition activity through a firm's lifetime can be consistent with the neo-classical view. The neo-classical view implies that acquisitions and diversification are undertaken to increase shareholder wealth.

2.3. Tests

The agency and neo-classical theories have implications for the acquisition rate of firms through their lifecycle, for how firm characteristics affect firms' acquisition decisions, and for how acquisitions affect firm value. We test these implications sequentially.

In section 5, we investigate whether a firm's age is related to its acquisition rate. To investigate such a relation, it is necessary to account for cohort effects and for economic condition effects. We use a number of specifications where we allow for age, cohort, and economic condition effects simultaneously. In section 6, we examine whether lifecycle effects can be explained by firm characteristics and how the determinants of the acquisition rate of young and mature firms differ. The agency view predicts such differences. We estimate models where the dependent variable is the number of acquisitions of a firm. We control for cohort effects and economic condition effects. We also estimate models where we examine the determinants of whether an acquisition is within the industry of the firm or is a diversifying acquisition. Again, we are interested in whether the determinants of the decision differ for young and mature firms. Finally, in section 7, we test whether the shareholder wealth impact of acquisitions differs between young and mature firms.

3. IPO and acquisition samples

In this section, we describe how we construct our sample of IPOs and then how we obtain our sample of acquisitions made by the IPO firms. The population of firms and their deals are obtained using the SDC database maintained by Thompson Reuters Financial Database. The IPO sample includes 7,759 original US common stock offerings from 1975 to 2008, excluding unit issues, spinoffs, privatizations, reverse LBOs, rights issues, ADRs, closed-end funds and trusts, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date are excluded. 7,506 firms out of the 7,759 IPOs have unique PERM numbers, which allow us to get the data on stock prices from the CRSP database.

By way of comparison, the sample of Celikyurt, Sevilir, and Shivdasani (2010) consists of 1,250 IPOs from 1985 to 2004 with proceeds greater than $100 million in 2004 dollars. The sample of Howakimian and Hutton (2010) is more comparable as they have 5,771 IPOs from 1980 to 2003, but they follow their firms for only three years. Our sample of IPOs is mostly the same as the Field-Ritter dataset (Loughran and Ritter, 2004; Field and Karpoff, 2002) made available by Professor Ritter on his website. The major exception is that we want to be inclusive in our IPO sample, so that we include all industries, penny stocks, and rollups in the sample used for the results reported in the tables, while the Field-Ritter dataset excludes banks, savings and loan companies, penny stocks and rollups. Penny stocks account for 6% of the IPOs and for 3% of the acquisitions made by IPO firms. Rollups account for 3% of the IPOs but 9% of the acquisitions. Penny stocks take place in the 1980s, while almost all rollups take place from 1996 to 1999. When appropriate, we discuss how our results are affected when we use more restrictive samples.

Table 1 shows our sample of 7,506 IPO firms. It is not surprising in light of the existing evidence on IPOs that the number of IPOs varies substantially over time. As expected, we have a large number of IPOs in the second half of the 1990s. The period from January 1995 to December 2000 has 34% of our IPOs. Further, underpricing is highest in 1999 and 2000. There is a high attrition rate for the firms in our sample. For the cohorts that exist at least ten years, on average only 43% of the firms survive ten years.

Through most of the paper, our sample of acquisition transactions includes all attempts to acquire another firm in whole or in part, whether public or private, or a subsidiary of another firm, but we also discuss results for a subsample, the control subsample, that includes only completed acquisitions where the acquirer acquires complete control of the acquired firm.[1] The inclusion of subsidiaries in the acquisitions follows the earlier literature (e.g., Celikyurt, Sevilir, and Shivdasani (2010) and Howakimian and Hutton (2010)). Our rationale for including subsidiaries in these measures is straightforward: the same set of activities could be organized as a private firm, a public firm, or as a subsidiary. From this perspective, a firm that grows by acquiring a subsidiary achieves the same outcome as it would have had if the activities of the subsidiary were organized as a public firm or a private firm. While the acquisition sample may be a better measure of acquisitive activity by a firm since it includes both partial and complete acquisitions, a measure involving control acquisitions may be a better measure of how a firm changes as a result of acquisitions. The control subsample is constructed as follows. We first eliminate all deals for which we cannot ascertain that the acquirer owns less than 50% of the acquired firm before the acquisition announcement. Within this subset of acquisitions, we then keep only the acquisitions for which we can ascertain that the acquirer owns 100% of the acquired firm after the acquisition. As a result of this screen, the control subsample is substantially smaller than the whole acquisitions sample.

Acquisition transactions for the 7,506 IPO firms are obtained from the SDC Mergers & Acquisitions database. Data on acquisitions is sparse before 1981. Therefore, we include only acquisitions announced from 1981 through 2012 by our IPO firms. We exclude repurchases, recapitalizations, and self-tenders. Out of 7,506 firms that had their IPO in the period from 1975 to 2008, 5,489 (73%) engaged in at least one merger or acquisition transaction in 1981-2012.[2] These firms had a total of 32,647 transactions with an average of 5.95 deals per firm, while 2,017 firms had no transaction recorded in this comprehensive database. SDC has information about acquisitions by the IPO firms that took place before these firms went public. However, we do not use that information in our analysis because it is not comprehensive,

[1] In this paper, we use the term subsidiary acquisition to denote the acquisition of a subsidiary, division, or a branch.
[2] The SDC database for M&A transactions starts in 1979.

though we do use the information that 1% of firms announced an acquisition on the same day as their IPO.

4. The acquisition rate through the firm's lifecycle

In this section, we investigate the conditional acquisition rate of firms through their lifecycle. The conditional acquisition rate is defined as the number of acquisitions by firms from a cohort in an event year divided by the number of firms in that cohort that have survived until the beginning of that event year. It is therefore the average number of acquisitions per firm in a cohort in an event year. We call this statistic the conditional acquisition rate in the remainder of the paper. Throughout the paper, age 0 is the calendar year in which the IPO takes place, so that age 1 is the first full calendar year of a public firm.

Figure 2 and Table A1 in the internet appendix show the conditional acquisition rate for each cohort from year 0 to year 25. We cut off the early cohorts at year 25 because there are too few firms in each cohort after that year. Firms make acquisitions steadily through their life. No cohort with an IPO after 1978 has a year without acquisitions. Figure 2 and Table A1 show the mean conditional acquisition rate across all cohorts. The peak acquisition year is year 1, the first full calendar year that a firm is public. The highest year 1 conditional acquisition rate is 1.64 for the 1997 cohort. Five cohorts have an average conditional acquisition rate that exceeds one in year 1. All of these cohorts are in the second half of the 1990s when the M&A market was extremely active. Though the peak acquisition rate is in the firm's first year after the IPO, mature cohorts have acquisition rates that become more comparable to the acquisition rate of young firms than of middle-age firms. In the first twenty years, the lowest acquisition rate is in year 7.

There is a striking change in the peak year of the conditional acquisition rate. The cohorts in the 1970s and the 1980s have a peak acquisition rate in later years of their life. Until 1990, all peak year conditional acquisition rates are after year 5. All but two are in year 10 or later. After 1990, all cohorts have a peak conditional acquisition rate year before year 5 and half (9 out of 18) have a peak conditional acquisition rate in year 1. The phenomenon of unusually high acquisitive activity by new firms is

therefore one that holds for the 1990s but not earlier. It is well-known, however, that characteristics of IPO firms changed in the 1990s, in that new public firms were less well-established than they were earlier (see Fama and French (2004)). In particular, firms that went public before the 1990s were more likely to be profitable when they went public. Another important consideration is that the firms that went public in the 1990s faced a hot M&A market in their youth. We investigate the relevance of this last consideration in the next section and of firm characteristics in section 6.

Looking at the evolution of the mean conditional acquisition rate after year 1, we see that it falls after year 1, reaching a minimum of 0.33 in year 7, and then increases again, so that the conditional acquisition rate of firms after year 9 is higher than the conditional acquisition rate of firms in years 4 to 9. It follows from these observations that the conditional acquisition rate through a firm's lifecycle suggests a u-shaped curve when we focus on the sample average. It is high in a firm's youth, lower in its middle age, and becomes higher again during its maturity. This pattern holds as well when we consider the median conditional acquisition rate (see Table A1). Though we do not show the results in a figure or table, we find the same results when we use the control subsample. These results are not due to serial acquirers as they hold when we eliminate firms with more than 5 acquisitions in a year (not tabulated).

So far, we have focused on the number of acquisitions by IPO firms. The same number of acquisitions at different stages of a firm's life could have very different implications if in one event year the acquisitions are small and in the other they are large. Ideally, therefore, we would also examine the amounts spent on acquisitions by firms during their lifecycle. As already explained, however, SDC does not report the consideration paid for a large fraction of acquisitions. For the acquisitions used to construct Figure 1, the acquisition consideration is not available for 52% of the acquisitions. Nevertheless, we report results for the amount spent on acquisitions as a fraction of the assets owned by firms in a cohort at the beginning of the year in internet appendix Table A2. To account for deals with no information, we construct the ratio using only the firms for which information on acquisition consideration is available for each acquisition they make and for which total assets is available at the beginning of the year. We call this statistic the conditional dollar acquisition rate. Because we exclude firms that make acquisitions for which

we do not have deal size information, some cohort years drop out in this analysis. We find that the mean conditional dollar acquisition rate is highest in year 2. The median conditional dollar acquisition rate is highest in year 1 and never reaches again a rate half as a high as that rate after year 4. The mean conditional dollar acquisition rate is higher for young firms as well. It is useful to note, however, that the high values of the dollar acquisition rate in years 1 and 2 are driven by extremely high conditional dollar acquisition rates in the second half of the 1990s. For instance, when we consider year 1, the peak conditional dollar acquisition rate is in 1999 and is more than three times the average. Similar results hold when we analyze the sample of completed acquisitions.

The analysis of this section shows that no case can be made for the sample as a whole that mature firms are more acquisitive than young firms. Since the early 1990s, firms have peak conditional acquisition rates early in life. However, while there is a clear u-shaped curve for the acquisition rate, the dollar acquisition rate, although more variable, is more consistent with a monotone decreasing rate through the firm's lifecycle. Though we do not reproduce the results in a table, all of our conclusions hold if we restrict the sample to exclude financial firms and utilities. Further, firms with stock prices below $5 have an acquisition pattern through the lifecycle that is similar to other firms.

Another way to investigate the acquisitive behavior of new firms is to look at the time that they make their first acquisition. We compute (but do not report in a table) the fraction of firms in a cohort that have their first acquisition in a given event year. We call this ratio the first-deal acquisition ratio. We find that the peak year of the first-deal acquisition ratio has changed over time. In the earlier years of our sample, the peak year of first-deal acquisitions is later in the life of firms. After 1988, for all years but one, the peak year is year 1. On average, 32% of IPO firms have their first acquisition in year 1 and 70% of IPO firms have made an acquisition by the end of year 2. Surprisingly, 42% of first acquisitions are diversifying acquisitions when an acquisition outside the main 2-digit SIC code of a firm is viewed as a diversifying acquisition. Further, 25% of first acquisitions are diversifying when none of the 2-digit SIC codes of the acquired firm overlap with the 2-digit SIC codes of the acquirer.

5. An examination of the acquisition rate of young and mature firms

In this section, we first compare the acquisition behavior of young and mature firms. Throughout the paper we call young firms those firms that are in the first three complete calendar years after their IPO, and mature firms those that are older than nine years from their IPO. We also estimate multiple regression models that investigate the determinants of the conditional acquisition rate of cohorts as the number of years from the IPO increases. Finally, we investigate whether the results are explained by differences in the age since incorporation of firms that go public. Though we primarily focus on the conditional acquisition rate, we also report results for the conditional dollar acquisition rate.

We compare in Table 2 the conditional acquisition rate of young firms and mature firms. We construct the average conditional acquisition rate for young and mature firms by averaging across cohorts for an event year and then averaging across event years for the event-year windows we focus on. Table 2 shows results for the whole sample as well as for the control subsample. We focus our discussion on the results for the whole sample shown in the first three columns of the table. The results for the last three columns correspond to the control subsample and are similar.

The acquisition rate of young firms is 32.5% higher than the acquisition rate of mature firms and the difference is significant at the 5% level. The higher acquisition rate of young firms holds if we consider the control subsample, if we eliminate financial firms and utilities from the sample, if we eliminate penny stocks, if we eliminate rollups, and, finally, if we eliminate high tech firms. Strikingly, the result is not a high tech firm result: It does not hold for these firms as these firms acquire as much when they are mature than when they are young. One might be concerned that our results holds because of young firms that do not survive. This is not the case. When we consider only firms that survive at least 10 years, we find the same results – albeit slightly stronger.

It is common in the IPO literature to distinguish between hot and cold IPO markets. The literature has a number of different ways to make that distinction. We use the approach of Yung, Colak and Wang (2008). They define a heat measure of the IPO market based on a quintile ranking approach using the quarterly number of IPOs. We categorize the heat measure as hot (4th and 5th quintiles), cold (1st

quintile), or neutral (2nd and 3rd quintiles). As a robustness check, we also use the approach of Helwege and Liang (2004). To define hot and cold IPO markets, they use the three-month moving average of the number of IPOs scaled by new business formations for each month. They define the top tercile of that measure to correspond to hot IPO months and the bottom tercile to correspond to cold IPO months. The correlation between the hot versus cold indicator variables based on these two methods is 97.7%. Firms that go public in a hot IPO market have a much higher acquisition rate when young than firms that go public in a cold market. Specifically, their acquisition rate is 63.4% higher than the acquisition rate of firms that go public in a cold market. Mature firms have insignificantly different acquisition rates whether they go public in a hot or cold market. For firms that do not go public in a hot IPO market, there is no significant difference in the acquisition rate between young and mature firms, while firms that go public in a hot IPO market have a much higher acquisition rate when young than when mature.

We consider next the relation between underpricing and the acquisition rate. Signaling theories of underpricing (Allen and Faulhaber (1989), Welch (1989)) suggest that firms with greater underpricing are those expected to have more growth opportunities, so that they would be likely to acquire more if acquisitions are a way to exploit these opportunities. Alternatively, if greater underpricing means that a firm received too little cash for its IPO, then we should see the opposite result. We show results for the conditional acquisition rate for quintiles of first-day returns, with quintiles computed within cohorts. We see that for young firms there is no difference in the acquisition rate for firms in the lowest IPO return quintile and the highest. However, mature firms that were in the lowest quintile of returns at the IPO have a significantly lower acquisition rate than mature firms that were in the highest quintile of returns. Finally, the conditional acquisition rate falls significantly as firms in the lowest quintile of returns mature, but it does not fall significantly for firms in the other quintiles. Maksimovic, Phillips, and Yang (2012) find related evidence that a firm's size and productivity at the time it goes public predicts asset purchases and sales ten years later. We also re-calculated the quintiles without dividing the sample into IPO cohorts and the results are qualitatively the same.

To evaluate the relation between the level of mergers and acquisition activity in the economy and the conditional acquisition rate of the IPO cohorts, we consider separately the merger wave years of the 1990s and the other years. We date the merger wave from 1995, the year of the Netscape IPO, to 2000, the year of the collapse of the internet boom. We see that the difference between the conditional acquisition rate of young firms and mature firms is dramatic for the 1990s merger wave years. However, there is no difference between these conditional acquisition rates when these years are excluded. This lack of a difference is not an issue of statistical power since we have more observations outside the merger wave period. Further, the rate of acquisition activity of young firms is more than twice as high during the 1990s merger wave years than in other years. We used an alternative way of looking at high merger and acquisitions years. Maksimovic, Phillips, and Yang (2012) have a measure of aggregate merger waves based on the merger activity of industrial firms. They define aggregate merger wave years as 1986, 1987, 1996, 1998-2000. Using this definition, we find similar results (not reproduced).

The literature emphasizes the importance of the industry lifecycle (Maksimovic and Phillips (2008)) and of industry merger waves (Harford (2005), Maksimovic, Phillips, and Yang (2012)). In results not reported in Table 2, we examine the acquisition rate of firms for quintiles of industry-years constructed according to industry-level merger activity. Our results hold irrespective of the intensity of industry-level merger activity. In section 6, we will report firm-level regressions that control for industry-level merger activity.

Figure 3 provides further evidence on the importance of merger activity for the acquisition behavior of IPO firms. We plot the mean conditional acquisition rate per event year for the whole sample, for the event years during the merger wave of the 1990s, for the other years, as well as for whether a firm goes public in a hot or cold IPO market. It is clear from the figure that there is a sharp difference in the acquisitive behavior of firms early in their public life depending on whether the market for acquisitions is very active or not.

Turning to the characteristics of the acquisitions, we first consider the rate at which firms make diversifying acquisitions. We estimate but do not tabulate a conditional acquisition rate for acquisitions in

the firm's main two-digit SIC code industry, which we call related acquisitions, as well as a conditional acquisition rate for other acquisitions, which we call diversifying acquisitions.[3] We find that young firms have a higher rate of diversifying acquisitions than mature firms. With the 49 Fama-French industries, the rate at which young and mature firms make diversifying acquisitions is not significantly different. These acquisitions are diversifying acquisitions in that they occur outside of the main two-digit SIC code industry of the firm, but they could take place in an industry in which the firm is already active. Therefore, we also investigate a stricter definition of diversification. The results for that definition are reproduced in Table 2. With this definition, an acquisition is a diversifying acquisition if it is in a 2-digit SIC code in which the firm has no existing activity according to SDC at the time of the acquisition or (if missing) from Compustat. With this stricter definition of diversification, the rate at which firms make diversifying acquisitions drops in half and is significantly lower than the rate at which they make related acquisitions. The rate at which young firms make diversifying acquisition is higher than the rate at which mature firms make such acquisitions. Consequently, the prediction that firms diversify more when they mature is not supported. We also provide proportion tests in which we show that the proportion of acquisitions that are diversifying ones is higher for young firms than for mature firms when we use the main SIC code of the firm and is not significantly different when we use all SIC codes. All this evidence is inconsistent with the agencies theories of diversification summarized in section 2.

Even though the use of SIC codes is the most common approach to estimate whether an acquisition is a diversifying one or not, these codes have obvious limitations. It is well-known that firms in apparently identical activities can have different two-digit SIC codes. An alternative approach to identifying firms in related activities is a text-based approach developed by Hoberg and Phillips (2010). This approach uses 10-Ks to identify competitors. As our third measure of diversification, we use their (static) identifiers. The

[3] With this definition, a firm that decides to integrate vertically is treated as a diversifying firm. An alternative approach left for further research would be to identify vertical integration separately using the input-output tables (Fan and Lang (2000), Matsusaka (1993), and Ozbas and Scharfstein (2011)). Note, however, that acquiring a firm that produces inputs for the industry or buy outputs does not mean that the acquisition is related in the sense that the acquirer would necessarily have useful specialized knowledge to manage the acquired firm. For instance, a car maker which acquires a tire producer would become more vertically integrated, but the car maker may have no skills or specialized knowledge that would be useful to manager the tire producer.

limitation of that approach for our study is that their identifiers are available for only part of our sample period and only for public firms, but there are many more acquisitions of private firms in our sample than acquisitions of public firms. Nevertheless, using their identifiers, we find (but do not tabulate) that there is no evidence that the rate at which firms acquire unrelated public firms increases with age as a public firm. Consequently, our result that firms do not make more diversifying acquisitions as they age is robust to this alternative approach of measuring diversification.

We find that the high acquisition rate of young firms is driven by their acquisitions of private firms. Young firms acquire private firms at a higher rate than mature firms and the fraction of acquisitions by young firms that are acquisitions of private firms is higher than the same fraction for mature firms. The difference in the rate of acquisitions of public firms between young and mature firms is not significant and neither is the difference for acquisitions of subsidiaries. It is clear from the data presented about the organizational form of the target that acquisitions of public firms are a small minority of all acquisitions both for young and for mature firms. Specifically, 9% of acquisitions of young firms are acquisitions of public firms and that percentage is 11% for mature firms. When we focus on the control subsample, the percentages are respectively 7% and 8%. It is useful to note that Howakimian and Hutton (2010) show that the fraction of acquisitions that are acquisitions of public firms in their IPO sample is 8.3% which is very similar to the fraction we compute. They also show that 18.3% of the acquisitions by firms that have at least three years of data in CRSP are acquisitions of public firms. This fraction is substantially higher than the one we compute, so that they find that mature firms are more likely to acquire a public firm than young firms. Their sample requires the deal size to be available, while ours does not.

Lastly, we consider how the acquisition is paid for. The rate of acquisitions paid for exclusively with stock is higher for young firms than for mature firms, but not the rate of acquisitions paid for with cash. Not surprisingly, therefore, the fraction of cash acquisitions is significantly higher for mature firms. It is important, however, not to forget that data on how acquisitions are paid for is missing for a majority of acquisitions. Another important caveat is that a firm could pay cash for an acquisition but might have issued equity to raise the cash. We investigate, but do not report in the table, whether the results for how

acquisitions are paid for differ depending on whether a firm goes public in a hot IPO market or a cold IPO market. We find that the proportion of acquisitions that are paid for with stock is significantly higher for firms that go public in a hot IPO market than for firms that go public in a cold IPO market. Hot IPO markets have higher underpricing. Relatedly, Howakimian and Hutton (2011) find that, with year fixed-effects, more underpriced firms are more likely to pay for acquisitions with equity.

We also examine the conditional dollar acquisition rate. The results are available in the internet appendix as Table A3. The sample used for this analysis excludes all deals of firms with at least one missing transaction value. We focus here on the sample of completed acquisitions. The results for the sample of acquisition attempts are similar. We find that mature firms spend less on acquisitions than young firms. Firms that go public in a hot market or a neutral market spend a lot more on acquisitions when young. As with the results in the first two columns, there is no difference in the acquisition rate of mature firms depending on whether they went public in a hot or a cold IPO market. There is no evidence that dollar acquisition activity differs in any way depending on the first-day return. However, even though the difference between the first and fifth quintile is not significant, its economic magnitude is large. Firms spend a lot more on acquisitions during the merger and IPO wave of the 1990s than at other times. Surprisingly, the conditional dollar acquisition rate falls as firms mature, but the difference is significant only for acquisitions that are not made during that wave.

Looking at the extent to which firms undertake diversifying acquisitions, we find that young firms spend more than mature firms on related and diversifying acquisitions when we use the firms' main SIC code to determine the nature of an acquisition, but when we use all of the firm's SIC codes, we see that there is no difference on spending on diversifying acquisitions between young and mature firms. Young firms spend much more on acquisitions of private firms than do mature firms. There is no difference in the spending on acquisitions of public firms between young and mature firms. It is useful to note that while young firms have a high acquisition rate of private companies, these acquisitions involve small firms so that there is no significant difference between young firms spending on public firms and their

spending on private firms. The conditional dollar acquisition rate is not significantly different for acquisitions paid for with cash and acquisitions paid for with stock whether firms are young or mature.

So far, we have ignored the fact that firms that go public in a calendar year vary in age since incorporation. We report here results taking into account the age of incorporation (the results are tabulated in the internet appendix as Table A4). When we divide firms into quintiles based on their age of incorporation, we find a surprisingly wide range of age since incorporation for the IPO firms. For the youngest quintile, the median age since incorporation is two years; for the oldest quintile, it is 40 years. The acquisition rate is higher for young firms than mature firms for all quintiles of age since incorporation, but the decrease in the acquisition rate is not always significant. There is no consistent relation between the quintile of age of incorporation and the relation between the acquisition rate of young and mature firms. Finally, we investigate whether the age of incorporation makes a difference in the acquisition behavior of firms early in their life by looking at individual years following the IPO. We see that there are no significant differences between firms with different age since incorporation quintiles at the time of their IPO.

The results presented in this section show that young firm make more acquisitions than mature firms for the whole sample. However, this result is quite sensitive to the organizational form of the target and to the state of the market for acquisitions. When we remove from our sample the merger wave of the late 1990s or when we focus on public firm acquisitions only, there is no evidence that young firms acquire more. Strikingly, young firms are at least as likely to make diversifying acquisitions as mature firms.

6. Does the acquisition rate vary with age?

In this section, we estimate lifecycle effects in the acquisition rate. It is well-known that estimation of such effects in cross-sections is biased because firms in a given year differ both because of their age and because of belonging to different cohorts. The problem is made worse here by the fact that the number of firms varies across IPO cohorts and depends on economic conditions since firms choose when they go public. Estimation that uses cohort variables rather than firm-level variables avoids this endogeneity

problem as the existence of an IPO cohort in a given year is not endogenous. However, we expect the acquisition rate of a cohort in a given calendar year to depend on the economic situation and to depend on characteristics of the cohort. For instance, we expect the acquisition rate of a cohort that is ten-years old is expected to be different in the middle of an aggregate merger wave as opposed to a recession. It is also plausible that the acquisition rate of a cohort depends on whether the cohort went public in a hot or a cold market.

A widely-used approach to estimating lifecycle effects in social sciences is to use indicator variables for age, period, and cohort.[4] The period indicator variables capture the economic conditions in such a setting. Such models are called APC models. There is a vast literature in the social sciences dealing with the estimation of such model. A simple approach to allow for age, cohort, and economic condition effects is to estimate a regression of a cohort's acquisition rate in year t (Y_{iht}) on an indicator variable for the cohort (C_i), an indicator variable for the age of the firms in the cohort, (A_h), and an indicator variable for the calendar year (T_t) to take into account economic conditions that affect all firms in a cohort. Remember that age is defined in relation to the IPO. Hence, the regression model can be represented as follows:

$$Y_{iht} = \sum_{j=0} C_i I_{\{i=j\}} + \sum_{j=1} A_h I_{\{h=j\}} + \sum_{j=1} T_t I_{\{t=j\}} + \epsilon_{iht} \quad (1)$$

If the time intervals over which age and period take values are of the same width, the regression cannot be estimated because the age of firms in a cohort is given by the calendar time when the cohort is observed minus the calendar time at the start of the cohort. The literature has proposed many different approaches to deal with this issue (see Yang (2011) for a recent review and references). The most frequently used approaches involve using nonlinear functions for the age, period, or cohort effects, imposing constraints on the coefficients of the effects, or using proxies for these effects. We use all three approaches. Our conclusions do not depend on the approach chosen. In our case, regression (1) can be estimated because the age and period variables do not take values over the same intervals. With our data, we have no observations for the dependent variable from 1975 to 1980 and no observations for the cohort

[4] See, for instance, Mason and Fienberg (1985).

variable from 2008 to 2012. Further, we require a cohort-year to have at least 20 firms at the start of an event year. Because of this restriction, the maximum age in our sample is 31 years. The first column of Table 3 shows that the age, the cohort, and the calendar-year effects are each significant. We do not reproduce the estimates of the indicator variables, but in Figure 4A we show the estimates of the age indicator variables. That figure shows that there is a strong u-shape in the coefficients on the age indicator variables.

Since our ability to estimate regression (1) is driven by data availability, we implement alternative approaches suggested in the literature to estimate APC models that rely on assumptions about the economic effects we are estimating. These various approaches lead to conclusions that are supportive of the estimates of regression (1).

We estimate first a regression where we specify the age effect to follow a quadratic function. The regression has period effects and cohort effects modeled with indicator variables. Regression (2) shows that the age effect falls significantly with the level of age and increases significantly with age squared. The concave function reaches a minimum between years 5 and 6. Since were are interested in comparing young and mature firms, a natural constraint to impose on regression (1) is that the age effects depend on whether a firm is young, middle-aged, or mature. We also constrain the period indicator variable to have the same coefficient for each merger wave year and to have the same coefficient for each other year, which amounts to assuming that the relevant economic condition effects are captured by the state of the market for corporate control. This is a strong assumption, but it is reasonable to think that the state of the market for corporate control will be the most important effect common to all firms in a cohort in terms of economic conditions. We then have cohort fixed-effects to control for cohort effects. Regression (3) estimates this specification. We find that middle-aged firms acquire less than young and mature firms, which is consistent with the u-shape estimated in regression (1). Mature firms do not have a different acquisition rate from young firms. Not surprisingly, the indicator variable for a merger wave has a strong positive coefficient. In regression (4), we use an index of merger activity as our proxy for period effects. This variable has the advantage of being a continuous variable. The index has a significant positive

coefficient. Again, middle-aged firms acquire less, but now mature firms acquire more than young firms. In regression (5), we use the merger wave indicator variable and an indicator variable for whether a cohort started in a hot IPO market and an indicator variable for whether it started in a cold IPO market. It turns out that whether a cohort started in a hot or cold market is not related to its acquisition rate when we control for the state of the market for corporate control. The coefficients on the indicator variables for young and middle-age firms are similar to the coefficients in regression (2). Finally, in regression (6), we introduce an interaction between the merger wave indicator variable and the age indicator variable. We find that the merger wave is associated with a much higher acquisition rate for young firms but the interaction is not significant for middle-aged or mature firms. In other words, the acquisition rate of young firms is extremely sensitive to the aggregate merger waves. It is clear from the regressions of Table 3 that young firms do not acquire more than mature firms. Rather, the acquisition rate of young firms is more dependent on economic conditions. After removing the impact of economic conditions, young and mature firms acquire similarly.

We now use the same approach to investigate whether older firms diversify more than younger firms. We find again that cohort, age, and calendar effects are significant. However, as shown in Figure 4B, while the age coefficients are significant for young firms, they are not for firms older than five years. In regression (7), we estimate the age effect using a quadratic function. We find that the level effect is estimated very imprecisely, while the squared term has a positive significant coefficient. In regression (8), we see that middle-aged firms diversify less. There is no difference in the rate of diversifying acquisitions between young and mature firms. The coefficient on the merger wave indicator variable is positive and significant. The significant coefficients on the indicator variables in regression (8) are approximately a fourth of the value of the coefficients in regression (3). Such a result does not mean that the age and merger wave effects are much smaller for diversifying acquisitions than for the whole sample because the average event-year acquisition rate for the whole sample is larger than the average event-year acquisition rate for diversifying acquisitions. The other regressions for the diversifying acquisitions are scaled-down versions of the regressions for the whole sample of acquisitions. Consequently, while we find some

evidence of a u-shape for diversifying acquisitions when we control for cohort and calendar-year effects, this evidence is mixed compared to the evidence for the sample of all acquisitions.

6. The likelihood of announcing acquisitions through the firm's lifecycle

As discussed earlier, theories of corporate finance often advance different motivations for acquisitions by young firms and by mature firms. If that is the case, it should be that determinants of the acquisition rate differ between young and mature firms. In this section, we use firm-level characteristics to investigate whether the determinants of the acquisition rate and of diversifying acquisitions differ for young and mature firms. We also investigate whether the life-cycle effects documented earlier can be explained by firm characteristics. In other words, it could be that firm characteristics change in predictable ways over the life cycle of firms and that these changes explained by the life-cycle effects.

6.1. Firm characteristics and the acquisition rate

With the agency view discussed in section 2, we expect firms to acquire and diversify when they run out of growth opportunities. They do so not to exploit some valuable asset, but instead to keep growing to benefit management. Hence, we would expect mature firms that acquire and diversify to be firms with a low Tobin's q. Figure 5 shows that this is not the case. We see that the mean q ratio of acquirers is always higher than the mean q ratio of non-acquirers irrespective of the age of firms. The annual mean difference between the acquiring firms and the non-acquiring firms is significant at the 1% level. We also see that q falls with age.

To investigate the relation between the acquisition rate and firm characteristics, we estimate negative binomial count models. Our regressions use lagged firm characteristics, so that there is no concern that acquisitions affect these characteristics. Howakimian and Hutton (2010) estimate logit models for acquisition activity by young firms. Their focus is quite different from ours as they are mostly concerned about how IPO-related firm characteristics are correlated with acquisition behavior. Logit models estimate whether a firm is likely to acquire during a year or not. Instead, the negative binomial count

model estimates how many acquisitions a firm is likely to make. The dependent variable of the negative binomial count models we estimate is therefore the acquisition rate of a firm in an event year. We also estimate, but do not tabulate, a regression using a Poisson count model and reach similar conclusions. The negative binomial model is a more flexible model. With the theory that firms acquire to make the best use of valuable scarce assets, we would expect better performing firms and firms with better growth opportunities to acquire more, irrespective of whether they are young or mature. In contrast, if firms acquire to replenish their growth opportunities, we would expect the acquisition rate of firms to be higher when they have lower growth opportunities and poorer performance.

We use two measures of performance. Our first measure is a firm's stock return in the previous year. The second measure is a firm's operating cash flow in the previous year, defined as operating income before depreciation, taxes, dividends and related expenses. For our measure of growth opportunities, we use Tobin's q. These three variables are commonly used in models that predict acquisition behavior (e.g. Palepu (1986)). We use two measures of financial strength. First, we use the firm's debt to assets ratio of the year before. Everything else equal, we would expect more highly-levered firms to be less likely to acquire. Second, we use indicator variables for whether the firm has an investment-grade credit rating or a non-investment grade credit rating. Again, we expect firms to be more likely to acquire with an investment-grade rating. We also use a firm's capital expenditures, normalized by total assets as a regressor. The coefficient on that variable does not have clear implications for our hypotheses. As shown by Warusawitharana (2008), firms that want to grow quickly are more likely to do so through acquisitions than through capital expenditures, so that we would expect a negative coefficient on capital expenditures. However, it could also be that acquisitions are complementary with capital expenditures. In particular, firms with good growth opportunities could have high capital expenditures as well as high acquisitions. Theories that predict that firms acquire because of poor internal investment opportunities would predict a negative relation between acquisitions and capital expenditures. We use two proxies for economic conditions. First, we use a measure of credit spreads. Second, we use the indicator variables for aggregate merger waves. In regressions that are not reported, we also use the Maksimovic, Phillips, and Yang

(2012) indicator of aggregate merger waves with similar results. To account for industry-specific conditions, we use the extent of delistings due to acquisitions in the firm's 2-digit SIC code and the rate of IPOs in the firm's 2-digit SIC code. Both variables are normalized by the number of firms in that 2-digit SIC code at the end of the previous year on CRSP. Finally, we control for firm size. We winsorize the explanatory variables at the 1% and 99% level to eliminate variables that are questionable and whose extreme values could affect the regression coefficient meaningfully.

The first two regressions of Table 4 test for the existence of life-cycle effects when we control for firm characteristics, industry conditions, and economic conditions. Regression (1) in Table 4 estimates a regression using the whole sample. We model life-cycle effects using the quadratic formulation of regression (2) in Table 3. The dependent variable is the number of acquisitions. The regression has a negative coefficient for age and a positive coefficient for the age squared. Both of these coefficients are positive and significant. However, the minimum of the concave function is now at 12.5 years, which is more than the minimum in Table 3. Hence, controlling for firm characteristics does not explain the life-cycle effects, but it changes the estimates of these effects. We find that the rate of acquisitions is increasing in the number of IPOs in an industry and the number of delistings. Not surprisingly in light of the results of Maksimovic, Phillips, and Yang (2012), a higher credit spread is associated with a lower acquisition rate. Firms with a credit rating acquire more and so do firms with lower leverage. Firms with better performance acquire more, so that firms with a higher stock return or higher cash flow acquire more. Not surprisingly, firms acquire more during a merger wave. As expected from the neo-classical models, the acquisition rate increases with Tobin's q. Surprisingly, larger firms do not acquire more. The relation between the acquisition rate and capital expenditures is not significant.

We re-estimate the regression using indicator variables for middle-aged and mature firms. Since regression (1) shows that the lowest acquisition rate is when firms are mature, we would expect the coefficients on the indicator variables for firms' stage of the life-cycle to have different estimates than in Table 3 when we control for firm characteristics. Regression (2) shows that this is the case. We see that

both coefficients are negative. The specification of the life-cycle effects has no impact on the other coefficients in the regression.

We now turn to the question of whether the determinants of the acquisition rate of a firm depend on its life-cycle stage. Regression (3) shows estimates of a regression where we interact the indicator variables for middle-aged and mature firms with the determinants of the acquisition rate used in regressions (1) and (2). Multicollinearity is a concern with such a regression. The problem is substantially reduced by not interacting the credit spread variable. Nevertheless, we also estimate separate regressions for young, middle-aged, and mature firms. These are regressions (4), (5), and (6) respectively. These regressions lead to similar conclusions as regression (3).

From section 2, the agency view implies that mature firms should acquire more if they have poor growth opportunities. We find no evidence consistent with this prediction. The relation between the acquisition rate and Tobin's q is the same irrespective of the firm's life-cycle stage. The agency view also implies that firms with more cash flow acquire more. Surprisingly, there is no support for the prediction that the acquisition rate of older firms is more sensitive to cash flow. In fact, the evidence is opposite to that prediction as the acquisition rate of mature firms does not depend significantly on cash flow while the acquisition rate of younger firms does so strongly. The relation between the acquisition rate and capital expenditures depends on a firm's stage of the lifecycle. Acquisitions appear to be substitutes for capital expenditures for young firms but unrelated to capital expenditures for mature firms. Lastly, the acquisition rate falls with size for young firms but increases with size for mature firms.

The agency explanation for the u-shape hypothesis is that older firms make acquisitions to acquire growth opportunities because they have exhausted their growth opportunities. This view implies that mature firms that have low growth opportunities and performance make more acquisitions. Our evidence is contrary to that view. Mature firms make more acquisitions when they have higher returns and a higher Tobin's q, but not when they have higher cash flow. Strikingly, the acquisition rate of mature firms is as sensitive to Tobin's q as the rate of young firms.

6.2. The determinants of diversifying acquisitions

We now investigate the discrete choice between announcing no deals, a related deal or an unrelated deal in a given year. One approach is to assume that a firm considers each of these options as separate projects. It evaluates the NPV of each project and picks one. With this approach, these are independent choices that are evaluated simultaneously and a multinomial logit specification is appropriate in modeling such firm behavior. Though we do not reproduce the results in a table, we estimate models where the choices are not independent choices. Such models make it possible to test for whether the choice is independent and we could not reject that it is. We want to understand whether the determinants of making a diversifying acquisition differ between young and mature firms. Since a firm can make multiple acquisitions in a year, we classify a firm that makes multiple acquisitions as a diversifying firm if it makes more diversifying acquisitions than related acquisitions. We eliminate firm-years for which a firm makes an equal number of diversifying and related acquisitions.

The two first regressions of Table 5 investigate whether the rate of related and diversifying acquisitions exhibit life-cycle effects when controlling for industry, firm, and economic condition characteristics. We use the same regressors as in Table 4. We find that there is no difference in life-cycle effects between related and unrelated acquisitions irrespective of the specification we use. For most regressors, the coefficients are very similar between related and unrelated acquisitions. The main exceptions are with the industry variables. A high IPO rate in the industry has more of an impact on diversifying than on related acquisitions. A possible explanation for this result is that during an IPO wave new firms are particularly productive, which leads them to use their skills in other industries. In contrast, more delistings because of acquisitions leads the survivors to acquire more within the industry, which is what we would expect if there is an industry consolidation.

Regression (3) allows the slopes to differ depending on the life-cycle state of the firm. Relatively few regressors have differential effects depending on the life-cycle stage. However, more financially fragile firms that are middle-aged or mature are less likely to diversify. Except for young firms, capital expenditures and related acquisitions are complements, while unrelated acquisitions appear to be

substitutes both for young firms and mature firms. High cash flow mature firms acquire less, and especially through diversifying acquisitions. Being in a merger wave has less an impact on older firms for related acquisitions but not for unrelated acquisitions. While the relation between Tobin's q and the rate of diversifying acquisitions is the same for young and mature firms, related acquisitions by mature firms are less sensitive to q than unrelated acquisitions. Finally, large mature firms acquire more, but large young firms acquire less. Regressions (4) – (6) show estimates for firms in different life-cycle stages. These estimates are similar to those implied by regression (3).

Table 5 shows that there is no support for the view that mature firms with higher cash flow are more likely to make diversifying acquisitions and for the view that mature firms with fewer growth opportunities are more likely to make diversifying acquisitions.

7. The market's reaction to acquisitions by young and mature firms

In this section, we investigate the stock-price reaction to acquisition announcements by young and mature firms. If firms make acquisitions because of an unexpected lack of growth opportunities, we expect an especially poor reaction to acquisitions by young firms since they just went public partly based on their investment opportunities. If young firms make acquisitions to exploit their growth opportunities because acquisitions are complementary to capital expenditures or to take advantage of newly developed capabilities, there would be no reason for the market to react adversely to acquisitions and it might react more positively than to acquisitions made later in the lifecycle as the acquisitions might convey favorable information about the capabilities developed by the firm. Matsusaka (2003) predicts a positive reaction to acquisitions made by young firms that have developed new capabilities.

We estimate abnormal returns as net-of-market returns over the window [-1,+1] around the first announcement date. Such an approach is especially appropriate for young firms since we do not have much data to estimate a market model. It is well-known from the literature that announcement returns

differ by the type of target and by the method of payment.[5] In Table 6, we therefore provide announcement return estimates for acquisitions by young and mature firms across all combinations of type of target and method of payment. However, only a subset of acquisitions has information on the method of payment.

The first panel reports abnormal returns for all acquisitions. We see that the abnormal return of young firms is 1.26% on average and is twice the abnormal return of mature firms, which is 0.62%. The market's reaction is therefore inconsistent with the hypothesis that acquisition announcements by young firms convey adverse information about their growth opportunities. When we consider different types of targets, we see that young firms have higher abnormal returns than mature firms for both acquisitions of private targets and acquisitions of subsidiaries. There is no difference in abnormal returns between young and mature firms for acquisitions of public firms. When we turn to acquisitions for which the method of payment information is available, we have a much smaller sample. The results are provided in the next panel of the table. The results are similar to those of the first panel, but significance is lower.

We consider separately acquisitions paid for with cash and acquisitions paid for with equity. Strikingly, young firms have higher abnormal returns than mature firms when they acquire public firms for cash. The same result holds for subsidiaries. However, there is no significant difference for acquisitions of private firms. When we turn to acquisitions paid for with stock, we find that for the whole sample of such acquisitions, the average abnormal return for young firms is not higher than the average abnormal return of mature firms, but the median is. The difference in abnormal returns between young and mature firms for acquisitions paid for with stock is insignificant for each type of target. However, it is well-known from the literature that acquisitions paid for with stock are associated with positive abnormal returns for targets other than public firms and are associated with sharp negative abnormal returns for public firm targets. We find that this result holds here for young as well as for mature firms.

In Table 7, we separate acquisitions into diversifying and related acquisitions using our stricter definition of diversification. To the extent that firms diversify when they have poor internal growth

[5] See, for instance, Fuller, Netter, and Stegemoller (2002).

opportunities, we would expect diversifying acquisitions to signal to the market that a firm does not have good internal growth opportunities. However, for cash acquisitions as well as for stock acquisitions, there is no evidence for the whole sample that the market reacts differently to diversifying acquisitions by young or mature firms. When we look at specific target types, there is no case in which the market reacts more adversely to diversifying acquisitions by young firms. Strikingly, for public firm targets, the stock-price reaction is higher for diversifying acquisitions by young firms than by mature firms. We saw in Table 6 that the only acquisitions by young firms to which the market reacts negatively are acquisitions of public firms paid for with stock. This result is due to related acquisitions. The market reacts more favorably to diversifying acquisitions by young firms paid for with stock than to related acquisitions. We also investigated the returns of acquisitions using our broader measure of diversification (not tabulated). With this measure, the results are largely similar to those using the stricter definition.

8. Conclusion

In this paper, we investigate the acquisition behavior of IPO cohorts through their lifecycle. We find that the acquisition rate of IPO cohorts follows a u-shaped curve on average through our sample period: the acquisition rate is higher when firms are young (their first three complete calendar years) and when they are mature (years ten to twenty) than when they are middle-aged (years four to nine). This pattern is heavily influenced by the intensity of activity in the acquisition market, so that the state of activity of the acquisition market explains more of the acquisition rate of a cohort in a given year than the lifecycle stage of that cohort. During the merger/IPO wave of 1995 to 2000, young firms were dramatically more acquisitive than mature firms. In contrast, in other periods, mature firms are on average as acquisitive as young firms. The higher acquisition rate of young firms is entirely due to their higher propensity to acquire private firms. There is no evidence that young firms have a higher acquisition rate of public firms than mature firms. Firms typically acquire firms that are smaller than they are. While the higher propensity of young firms to acquire private firms could be explained by the fact that young firms are small, so that there are relatively few smaller public firms, future research should help understand better

how new public firms choose the private firms they acquire and what benefits they obtain from such acquisitions. When we control for firm and industry characteristics, life-cycle effects remain, but the age at which firms acquire the least is higher than when we do not control for these characteristics. As a result, mature firms on average acquire less than young firms even though the acquisition rate still has a u-shape through firms' lifecycle.

Strikingly, we show that firms diversify throughout their lifecycle, so that young firms do not make fewer diversifying acquisitions than mature firms. This evidence is not supportive of the view that diversification is what firms do when they have run out of growth opportunities internally. Neither is our evidence that both young and mature firms diversify when they have good growth opportunities. Assuming that our measures of diversification are reliable, these results imply that agency theories of diversification do not describe the diversification activities of the typical firm in our sample. To the extent that firms have valuable assets that would be underutilized without diversification, we would expect these firms to have a high Tobin's q, so that our evidence is consistent with such theories of diversification. These results rely heavily on the use of SIC codes for the sample as a whole and are therefore subject to the limitations of the SIC codes. The use of SIC codes is well-established in the literature, but it suffers from the fact that firms can be quite similar in their activities even though they have different two-digit SIC codes. Unfortunately, newer approaches that help reduce these problems are not well-suited for our sample which is dominated by acquisitions of private firms. Further research should investigate approaches that would permit a better evaluation of whether acquisitions in general and of private firms in particular are related or unrelated acquisitions and should develop richer measures of relatedness.

We focused on two views of the acquisition behavior of firms through their lifecycle. One view is that firms acquire early because they are highly productive, so that they should have more assets under their control. Throughout the lifecycle, the firms that acquire more are firms with better growth opportunities. The other view is that firms acquire when mature because they have to replace growth opportunities and spend their free cash flow. When we analyze the determinants of acquisitions for mature firms, our evidence is that these determinants are surprisingly similar to the determinants of young firms. Mature

firms that acquire are those which perform well and have good investment opportunities. They are not firms that squander resources or low q firms that are trying to acquire growth opportunities. An important question for future research is why firms seem to acquire less in their middle-age. A plausible explanation is that it takes them time to integrate the acquisitions they make as young firms, but we are not aware of theoretical work that addresses that issue.

If diversifying acquisitions made by mature firms are inefficient because they involve using free cash flow to acquire growth opportunities for which they do not have a clear advantage, we would expect the market to react unfavorably to diversifying acquisitions by mature firms. We find no such evidence. Though the market reacts better to acquisitions by young firms, whether diversifying or not, when we distinguish between related and unrelated acquisitions, the only acquisitions that the market reacts adversely to are related acquisitions of public firms paid for with stock by young and mature firms. In summary, our evidence is supportive of the view that, on average, firms make acquisitions to exploit scarce valuable assets whether these firms are young or mature.

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Table 1. IPO sample and rate of survival

IPOs are identified using the SDC Global Issues Database. The IPO sample includes all initial public offerings in 1975-2008, and excludes reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date are excluded. Acquisition deals of the IPO firms include all acquisitions in the SDC's M&A database for 1981-2012. Age refers to the deal year with respect to the IPO year.. The first three columns provide the IPO year, total number of IPOs in each IPO year, and the percentage of new IPOs in each IPO year compared to the total number of IPOs in the sample. IPO proceeds are reported by the SDC Global Issues Database and calculated as the total number of shares issued multiplied by the offer price. IPO underpricing is calculated as the percentage initial return $(P_1-P_0)*100/P_0$, where P_1 is the first-day closing stock price or bid-ask average (from CRSP) and P_0 is the IPO offer price. Total Assets ($M) are reported by SDC and are measured before the IPO. All dollar values are reported in 2004 dollars using the CPI as a deflator. IPO total assets are available for 4,847 (67%). IPO underpricing is calculated for the all IPOs for which data are available. The post-IPO survival rate is calculated as the number of firms alive as of January 1st of the 5th, 10th, and 20th event year over the total number of IPO firms. The last two columns report the total number and percentage of IPO firms that survived until the end of the sample period, January 1st, 2012.

IPO Year	Total # of IPOs		Median IPO Proceeds ($M)	Median IPO Underpricing (%)[a]	Median IPO Total Assets ($M)[a]	Survival Rate							
						January 1st of Event Year						End of Sample Period (January 1st, 2012)	
						Year 5		Year 10		Year 20			
1975	5	0.07%	57.93	4.38		4	80%	3	60%	3	60%	1	20%
1976	32	0.43%	18.43	0.56		24	75%	12	38%	10	31%	2	6%
1977	22	0.29%	12.55	5.00		14	64%	7	32%	6	27%	1	5%
1978	28	0.37%	15.80	13.29		20	71%	15	54%	6	21%	1	4%
1979	54	0.72%	17.70	5.47		44	81%	27	50%	13	24%	5	9%
1980	103	1.37%	12.39	11.72	82.19	83	81%	52	50%	19	18%	11	11%
1981	241	3.21%	12.47	3.57	37.41	183	76%	110	46%	47	20%	26	11%
1982	85	1.13%	9.85	5.73	23.00	60	71%	36	42%	18	21%	7	8%
1983	494	6.58%	19.55	3.99	36.04	366	74%	216	44%	83	17%	37	7%
1984	221	2.94%	10.91	1.43	44.18	143	65%	88	40%	38	17%	25	11%
1985	219	2.92%	15.41	3.96	23.70	158	72%	98	45%	31	14%	14	6%
1986	459	6.12%	19.13	2.86	42.40	343	75%	228	50%	83	18%	54	12%
1987	324	4.32%	17.25	2.38	25.61	229	71%	151	47%	54	17%	36	11%
1988	139	1.85%	19.29	2.63	40.88	95	68%	63	45%	28	20%	21	15%
1989	116	1.55%	23.64	5.00	30.92	92	79%	58	50%	23	20%	19	16%
1990	105	1.40%	24.28	7.11	23.85	85	81%	49	47%	20	19%	18	17%
1991	231	3.08%	34.95	9.58	29.40	193	84%	113	49%	49	21%	47	20%
1992	306	4.08%	30.80	4.62	24.17	237	77%	130	42%	69	23%	69	23%
1993	475	6.33%	35.30	6.52	40.53	362	76%	192	40%			97	20%
1994	395	5.26%	30.62	3.85	28.93	274	69%	145	37%			67	17%
1995	437	5.82%	38.67	14.43	26.53	266	61%	151	35%			80	18%
1996	650	8.66%	38.41	9.91	20.53	343	53%	203	31%			102	16%
1997	449	5.98%	38.10	9.38	27.89	242	54%	144	32%			90	20%
1998	284	3.78%	43.42	8.33	36.16	161	57%	89	31%			66	23%
1999	435	5.80%	68.03	38.54	35.09	226	52%	139	32%			108	25%
2000	328	4.37%	81.83	26.61	81.67	197	60%	100	30%			83	25%
2001	65	0.87%	98.00	13.00	166.77	46	71%	34	52%			32	49%
2002	67	0.89%	91.85	2.73	232.37	43	64%	31	46%			31	46%
2003	71	0.95%	100.61	8.33	179.35	49	0.69					36	51%
2004	199	2.65%	87.50	5.25	122.10	141	0.709					107	54%
2005	154	2.05%	81.25	7.04	176.08	112	0.727					91	59%
2006	152	2.03%	88.87	5.73	160.98	105	0.691					99	65%
2007	141	1.88%	89.28	6.20	108.55	97	0.688					97	69%
2008	20	0.27%	130.71	-3.22	94.14							16	80%
Total	7,506	100.00%				5037	67%	2684	36%	600	8%	1596	21%
Median Values Across IPO cohorts			32.88	5.60	37.41								

Table 2. Conditional acquisition rate of young versus mature firms.
The sample is the same as in the earlier tables. Age refers to the year relative to the IPO year. The conditional acquisition rate is the ratio of acquisitions of a given type in a year divided by the number of firms alive and public at the beginning of that year. The IPO market is classified as hot (4^{th} and 5^{th} quintiles), cold (1^{st} quintile), or neutral (2^{nd} and 3^{rd} quintiles) based on a quintile ranking approach to quarterly number of IPOs as the heat measure of IPO market following Yung, Colak and Wang (2008). The merger wave denotes the period from 1995 to 2000. IPO underpricing is calculated as the percentage initial return $(P_1-P_0)*100/P_0$, where P_1 is the first-day closing stock price or bid-ask average (from CRSP) and P_0 is the IPO offer price. The IPO underpricing quintiles are obtained using the sub-sample of 7,271 IPOs (out of 7,506) for which we have data and the lowest quintile corresponds to the IPOs with the lowest first-day returns. The method of payment is reported by SDC for deals that are classified as having disclosed the details of the transactions. The target's organizational form is classified using the data available in SDC into private, public, subsidiary, and unknown. The superscripts ^{a,b,c} denote statistical significance at the 1%, 5%, and 10% level, respectively. The tests of means use a t-statistic and the tests of proportions use a z-statistic.

	All acquisitions			Completed acquisitions		
	[1]	[2]	Test of means [1]-[2]	[1]	[2]	Test of means [1]-[2]
	Young	Mature		Young	Mature	
Event years	1-3	10-20		1-3	10-20	
Mean conditional acquisition rate	0.53	0.40	*2.11*[b]	0.42	0.31	*2.13*[b]
IPO year --Mean conditional acquisition rate						
[1] Hot	0.67	0.40	*2.61*[a]	0.55	0.32	*2.43*[b]
[2] Cold	0.41	0.38	*0.27*	0.30	0.28	*0.29*
Neutral	0.55	0.41	*1.57*	0.43	0.32	*1.51*
Test of means: [1]-[2]	*2.24*[b]	*0.20*		*2.42*[b]	*0.70*	
IPO return quintiles --(IPO cohort) Mean conditional acquisition rate						
1	0.49	0.31	*2.74*[a]	0.38	0.22	*2.71*[a]
2	0.48	0.39	*1.29*	0.37	0.31	*0.99*
3	0.51	0.39	*1.45*	0.39	0.27	*1.87*
4	0.58	0.45	*1.49*	0.46	0.36	*1.39*
5	0.62	0.61	*0.04*	0.51	0.47	*0.28*
Test of means:[1]-[5]	*-0.98*	*-3.39*[a]		*-1.00*	*-3.42*[a]	
Acquisition year --Mean conditional acquisition rate						
[1] Merger Wave	0.93	0.51	*3.77*[a]	0.76	0.37	*4.21*[a]
[2] Other	0.44	0.37	*1.20*	0.35	0.29	*1.08*
Test of means: [1]-[2]	*4.66*[a]	*1.90*[c]		*4.47*[a]	*1.37*	
Relatedness across **all** SICs--Mean conditional acquisition rate						
[1] Not in the same 2-digit SIC	0.11	0.08	*2.37*[b]	0.08	0.06	*2.52*[b]
[2] In the same 2-digit SIC	0.42	0.32	*1.88*[c]	0.34	0.25	*1.93*[c]
Test of proportions: [1]-[2]	*-2.70*[a]	*-2.27*[b]		*-2.45*[b]	*-2.05*[b]	
Target's status--Mean conditional acquisition rate						
[1] Private	0.35	0.23	*2.74*[a]	0.29	0.19	*2.72*[a]
[2] Public	0.04	0.04	*-1.54*	0.02	0.03	*-1.46*
[3] Subsidiary	0.14	0.12	*1.00*	0.11	0.09	*1.57*
Test of proportions: [1]-[2]	*3.13*[a]	*2.00*[b]		*2.89*[a]	*1.89*[c]	
Test of proportions: [1]-[3]	*1.92*[c]	*1.03*		*1.74*[c]	*1.01*	
Method of payment--Mean conditional acquisition rate						
[1] Cash	0.15	0.13	*0.79*	0.12	0.10	*1.08*
[2] Stock	0.05	0.03	*2.27*[b]	0.04	0.02	*2.23*[b]
Unknown	0.30	0.23	*1.96*[c]	0.24	0.17	*1.88*[c]
Test of proportions: [1]-[2]	*1.36*	*1.49*		*1.19*	*1.25*	
Relatedness across **all** SICs--Mean [Fraction of acquisitions]						
[1] Not in the same 2-digit SIC	0.24	0.20	*1.44*	0.22	0.19	*1.46*
[2] In the same 2-digit SIC	0.76	0.80	*-1.44*	0.78	0.81	*-1.46*
Test of proportions: [1]-[2]	*-4.02*[a]	*-4.43*[a]		*-4.28*[a]	*-4.63*[a]	
Target's status--Mean [Fraction of acquisitions]						
[1] Private	0.64	0.57	*3.23*[a]	0.66	0.60	*2.27*[b]
[2] Public	0.09	0.11	*-1.33*	0.07	0.08	*-1.23*
[3] Subsidiary	0.26	0.32	*-2.48*[b]	0.27	0.31	*-1.74*[c]
Test of proportions: [1]-[2]	*4.36*[a]	*3.58*[a]		*4.77*[a]	*4.10*[a]	
Test of proportions: [1]-[3]	*2.92*[a]	*1.89*[c]		*2.98*[a]	*2.17*[b]	
Method of payment--Mean [Fraction of acquisitions]						
[1] Cash	0.27	0.34	*-2.24*[b]	0.26	0.33	*-2.03*[b]
[2] Stock	0.09	0.06	*1.82*[c]	0.10	0.07	*1.32*
Both	0.04	0.03	*1.92*[c]	0.05	0.04	*1.51*
Unknown	0.60	0.57	*0.97*	0.59	0.56	*0.87*
Test of proportions: [1]-[2]	*1.82*[c]	*2.59*[a]		*1.64*	*2.39*[b]	

Table 3. Fixed-effects regressions for conditional acquisition rate of IPO cohorts during 1975-2008

This table presents the regression coefficients for panel regression models where the dependent variable is the conditional acquisition rate for IPO cohorts in year *t*. An IPO cohort is defined as the group of firms that went through their IPO in the same calendar year. We start off with 34 IPO cohorts that are followed longitudinally until Dec 31, 2012. IPO cohorts with less than 20 firms alive as of Jan 1st of an event year are excluded. The final sample for the regressions includes 32 IPO cohorts. Age refers to the number of years with respect to the IPO year. The merger wave denotes the period from 1995 to 2000. Merger index is constructed by dividing the total number of acquisitions in SDC by the number of active firms in Compustat. The IPO market is classified as hot (4th and 5th quintiles), cold (1st quintile), or neutral (2nd and 3rd quintiles) based on a quintile ranking approach to quarterly number of IPOs as the heat measure of IPO market following Yung, Colak and Wang (2008). . Robust standard errors with clustering on IPO-cohorts identified by IPO years are reported below the coefficient estimates. Standard errors in parentheses are presented under the coefficients. The superscripts [a,b,c] denote statistical significance at the 1%, 5%, and 10% level, respectively.

	All Acquisitions						Unrelated Acquisitions					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Age		-0.01[b]	0.003	0.01[a]	0.003	0.01[b]		0.009	-0.0003	0.002[a]	-0.0003	0.001
		0.03	0.003	0.003	0.003	0.003		0.01	0.001	0.001	0.001	0.001
Age-squared		0.001[a]	0.001[c]	0.001[b]	0.001[c]	0.0003		0.0003[a]	0.0002[a]	0.0002[a]	0.0002[a]	0.0001
		0.0001	0.0004	0.0004	0.0004	0.0004		0.00004	0.0001	0.0001	0.0001	0.0001
Merger $Wave_t$			0.24[a]		0.24[a]	0.11[a]			0.06[a]		0.06[a]	0.03[a]
			0.03		0.03	0.04			0.01		0.01	0.01
Merger $Index_t$				0.28[a]						0.07[a]		
				0.03						0.01		
Hot IPO cohort					-0.03						0.003	
					0.03						0.004	
Cold IPO cohort					-0.01						-0.01	
					0.05						0.01	
Merger $Wave_t$*Age						-0.01[a]						-0.003[b]
						0.01						0.001
Merger $Wave_t$*Age-squared						0.003[a]						0.001[b]
						0.001						0.0002
IPO year Dummies (1976-2008)	Incl.	Incl.					Incl.	Incl.				
	265.26[a]	247.59[a]					124.31[a]	115.69[a]				
Time Dummies (1982-2012)	Incl.	Incl.					Incl.	Incl.				
	207.97[a]	247.59[a]					111.77[a]	186.61[a]				
Age Dummies (1-32)	Incl.						Incl.					
	328.05[a]						207.84[a]					
IPO cohort Fixed Effects	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Constant	-0.21	-0.02	0.33[a]	0.08	0.35[a]	0.39a	-0.04	-0.02	0.08[a]	0.01	0.04[a]	0.08[a]
	0.15	0.17	0.03	0.05	0.03	0.02	0.09	0.09	0.003	0.01	0.01	0.003
Adjusted R-squared			0.23	0.31	0.23	0.29			0.18	0.24	0.18	0.22
Number of IPO cohorts identified by IPO year	32	32	32	32	32	32	32	32	32	32	32	32
Number of observations	533	533	533	533	533	533	517	517	517	517	517	517
Model	RE	RE	FE, Robust	FE, Robust	RE, Robust	FE, Robust	RE	RE	FE, Robust	FE, Robust	FE, Robust	FE, Robust

Table 4. Number of deals announced in a year following IPO.

IPO and acquisition data are obtained from SDC Platinum. The IPO sample includes all initial public offerings in 1975-2008, excluding reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date are excluded. Acquisitions of the IPO firms are identified using the SDC M&A database and include all acquisitions announced in 1981-2012. Age refers to the number of years with respect to the IPO year. The dependent variable is the total number of acquisition announcements made by firm *i* in year *t*. *New firm rate at the 2-digit SIC* is calculated as [the number of IPOs in year *t-1*/firms alive as of beginning of year *t-1*]. *Delisting rate at the 2-digit SIC* is calculated as [the number of firms delisted in year *t-1*/firms alive as of beginning of year *t-1*]. *Credit spread*$_{t-1}$ is the difference between the rates for C&I loans and the Federal Funds in year *t-1*. Corporate bonds which are rated at least as BB- by S&P are classified as *High investment grade bond* in year *t-1*. The book values of the acquirer's accounting variables are measured at the end of the fiscal year *t-1*, which is the year end immediately preceding the announcement year *t*. *Stock return* $_{t-1}$ is calculated as [Closing Stock Price$_{t-1}$+Dividends$_{t-1}$-Closing Stock Price$_{t-2}$]/[Closing Stock Price$_{t-2}$]. We use the first-day closing stock price or bid-ask average (from CRSP) as the Closing Stock Price at *t-2* for *t*=1. *Debt* $_{t-1}$ (sum of the current and long term liabilities), *Capital expenditure* $_{t-1}$, and the *Operating-cash-flow* $_{t-1}$ (operating income before depreciation-interest and related expense) are divided by the book value of fiscal yearend *Total Assets* $_{t-1}$. The Merger Wave $_t$ denotes the period from 1995 to 2000. The IPO market is classified as hot (4th and 5th quintiles), cold (1st quintile), or neutral (2nd and 3rd quintiles) based on a quintile ranking of the quarterly number of IPOs following Yung, Colak and Wang (2008). *Delisting rate* $_{t-1}$ *at the 2-digit SIC* is calculated as [the number of firms delisted in year *t-1*/firms alive as of beginning of year *t-1*].Tobin's Q, *TQ* $_{t-1}$, is calculated as [(common shares outstanding*fiscal yearend closing price)+ *Debt* $_{t-1}$)/*Total Assets* $_{t-1}$]. Event year zero which corresponds to the year of the IPO drops out of the regressions when lagged accounting variables are included. We used the data for the fiscal yearend of the IPO year to calculate lagged values for the first event year following the IPO (event year=1). Standard errors in parentheses are presented under the coefficients. The superscripts ^{a,b,c} denote statistical significance at the 1%, 5%, and 10% level, respectively.

	All	All	All	Young	Middle	Late
	[1]	[2]	[3]	[4]	[5]	[6]
Age	-0.05^a					
	0.01					
Age-squared	0.002^a					
	0.0004					
Age 4-9 years		-0.35^a	-0.20^a			
		0.03	0.04			
Age greater than 9 years		-0.47^a	-0.68^a			
		0.06	0.07			
New firm rate$_{2\text{-digit SIC},t-1}$	0.10^a	0.09^a	0.03	0.05^c	0.11^a	0.14^b
	0.02	0.02	0.02	0.02	0.04	0.06
New firm rate$_{2\text{-digit SIC},t-1}$*Age 4-9 years			0.08^b			
			0.04			
New firm rate$_{2\text{-digit SIC},t-1}$*Age >9 years			0.18^a			
			0.06			
Delisting rate via acquisitions$_{2\text{-digit SIC},t-1}$	0.13^a	0.13^a	0.09^a	0.08^b	0.12^a	0.18^a
	0.03	0.03	0.03	0.03	0.03	0.05
Delisting rate via acquisitions$_{2\text{-digit SIC},t-1}$*Age 4-9 years			0.02			
			0.03			
Delisting rate via acquisitions$_{2\text{-digit SIC},t-1}$*Age >9 years			0.08			
			0.05			
Credit Spread$_{t-1}$	-0.64^a	-0.63^a	-0.65^a	-0.78^a	-0.65^a	0.55^a
	0.06	0.05	0.05	0.08	0.07	0.16
High investment grade bond$_{t-1}$	1.07^a	1.07^a	0.94^a	0.93^a	1.09^a	1.09^a
	0.07	0.07	0.08	0.08	0.08	0.12
High investment grade bond$_{t-1}$*Age 4-9 years			0.15			
			0.1			
High investment grade bond$_{t-1}$*Age >9 years			0.13			
			0.14			
Low investment grade bond$_{t-1}$	0.95^a	0.94^a	0.49^a	0.48^a	0.70^a	1.01^a
	0.1	0.09	0.14	0.14	0.15	0.13
Low investment grade bond$_{t-1}$*Age 4-9 years			0.21			
			0.19			
Low investment grade bond$_{t-1}$*Age >9 years			0.51^a			
			0.19			
Return$_{t-1}$	0.05^a	0.05^a	0.12^a	0.12^a	0.03	0.06^b
	0.01	0.01	0.02	0.02	0.02	0.03

$Return_{t-1}$ *Age within 4-9 years			-0.09[a]			
			0.03			
$Return_{t-1}$ *Age >9 years			-0.07[b]			
			0.04			
$[Debt/Total\ Assets]_{i,t-1}$	-1.17[a]	-1.15[a]	-0.73[a]	-0.72[a]	-1.23[a]	-1.42[a]
	0.13	0.13	0.22	0.22	0.19	0.2
$[Debt/Total\ Assets]_{i,t-1}$ *Age within 4-9 years			-0.49[c]			
			0.28			
$[Debt/Total\ Assets]_{i,t-1}$ *Age >9 years			-0.64[b]			
			0.3			
$[Capital\ Exp./Total\ Assets]_{i,t-1}$	-0.2	-0.25	-1.26[a]	-1.20[a]	0.78[b]	0.01
	0.23	0.23	0.37	0.36	0.36	0.57
$[Capital\ Exp./Total\ Assets]_{i,t-1}$*Age within 4-9 years			2.02[a]			
			0.57			
$[Capital\ Exp./Total\ Assets]_{i,t-1}$*Age >9 years			1.31[c]			
			0.71			
$[Operating\text{-}cash\text{-}flow/Total\ Assets]_{t-1}$	1.10[a]	1.11[a]	1.33[a]	1.31[a]	1.54[a]	0.14
	0.07	0.07	0.11	0.1	0.13	0.16
$[Operating\text{-}cash\text{-}flow/Total\ Assets]_{i,t-1}$*Age within 4-9 years			0.19			
			0.17			
$[Operating\text{-}cash\text{-}flow/Total\ Assets]_{i,t-1}$*Age >9 years			-1.19[a]			
			0.2			
$Merger\ Wave_t$	0.36[a]	0.37[a]	0.50[a]	0.45[a]	0.24[a]	0.45[a]
	0.04	0.04	0.05	0.05	0.06	0.07
$Merger\ Wave_t$*Age within 4-9 years			-0.26[a]			
			0.07			
$Merger\ Wave_t$*Age >9 years			-0.09			
			0.09			
$TQ_{i,t-1}$	0.10[a]	0.10[a]	0.09[a]	0.09[a]	0.11[a]	0.09[a]
	0.01	0.01	0.01	0.01	0.02	0.02
$TQ_{i,t-1}$*Age within 4-9 years			0.02			
			0.03			
$TQ_{i,t-1}$*Age >9 years			0			
			0.03			
$Logged\ Total\ Assets_{i,t-1}$	0.01	0.00	-0.33[a]	-0.34[a]	-0.07	0.52[a]
	0.04	0.04	0.04	0.03	0.05	0.05
$Logged\ Total\ Assets_{i,t-1}$*Age within 4-9 years			0.26[a]			
			0.05			
$Logged\ Total\ Assets_{i,t-1}$*Age >9 years			0.81[a]			
			0.07			
Constant	-2.81[a]	-2.70[a]	-2.82[a]	-2.93[a]	-2.86[a]	0.28
	0.17	0.16	0.15	0.23	0.18	0.47
Chi-square	1921.77	1875.40	2549.80	1185.33	825.30	517.99
Robust std. errors	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firms (panels) for clustering errors	6143	6143	6143	5807	4815	2371
Number of observations	49999	49999	49999	14791	19607	15593

Table 5. Probability of announcing no deal, a related or an unrelated deal in a calendar year following the IPO.

IPO and acquisition data are obtained from SDC Platinum. The IPO sample includes all initial public offerings in 1975-2008, excluding reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date are excluded. Acquisitions of the IPO firms are identified using the SDC M&A database and include all acquisitions announced in 1981-2012. Age refers to the number of years with respect to the IPO year. In the Multinomial Logit regression, the dependent variable takes the value of 0 if the firm announced no acquisitions in year *t*, 1 if it had a related acquisition, and 2 if it had an unrelated acquisition. If a firm has more than one deal in a given year, we collapse it into one deal and classify it as related if the number of related deals is higher than unrelated ones and vice versa. We exclude firm-years in which there are equal numbers of related and unrelated deals from the regressions. *New firm rate at the 2-digit SIC* is calculated as [the number of IPOs in year *t-1*/firms alive as of beginning of year *t-1*]. *Delisting rate at the 2-digit SIC* is calculated as [the number of firms delisted in year *t-1*/firms alive as of beginning of year *t-1*]. *Credit spread*$_{t-1}$ is the difference between the rates for C&I loans and the Federal Funds in year *t-1*. Corporate bonds which are rated at least BB- by S&P are classified as *High investment grade bond* in year *t-1*. The book values of the acquirer's accounting variables are measured at the end of the fiscal year *t-1*, which is the year end immediately preceding the announcement year *t*. *Stock return* $_{t-1}$ is calculated as [Closing Stock Price$_{t-1}$+Dividends$_{t-1}$-Closing Stock Price$_{t-2}$]/[Closing Stock Price$_{t-2}$]. We use the first-day closing stock price or bid-ask average (from CRSP) as the Closing Stock Price at *t-2* for *t*=1. *Debt* $_{t-1}$ (sum of the current and long term liabilities), *Capital expenditure* $_{t-1}$, and the *Operating-cash-flow* $_{t-1}$ (operating income before depreciation-interest and related expense) are divided by the book value of fiscal yearend *Total Assets* $_{t-1}$. The Merger Wave $_t$ denotes the period from 1995 to 2000. Tobin's Q, *TQ* $_{t-1}$, is calculated as [(common shares outstanding*fiscal yearend closing price)+ *Debt* $_{t-1}$)/*Total Assets* $_{t-1}$]. All continuous firm-level covariates are winzorized at 1% and de-meaned at the firm-panel level. Industry covariates and *Stock return* $_{i,t-1}$ are further standardized at the population and firm-panel level respectively to eliminate multicollinearity, Event year zero which corresponds to the year of the IPO drops out of the regressions when lagged accounting variables are included. We used the data for the fiscal yearend of the IPO year to calculate lagged values for the first event year following the IPO (event year=1). Standard errors in parentheses are presented under the coefficients. The superscripts ^{a,b,c} denote statistical significance at the 1%, 5%, and 10% level, respectively.

Sample	All		All		All		Young		Middle		Late	
Model	[1]		[2]		[3]		[4]		[5]		[6]	
Base outcome	No deal		No deal		No deal		No deal		No deal		No deal	
Outcomes	Rel.	Unrel.	Rel.	Unrel.	Rel.	Unrel.	Rel.	Unrel.	Rel.	Unrel.	Rel.	Unrel.
Age	-0.09^a	-0.09^a										
	0.01	0.01										
Age-squared	0.002^a	0.002^a										
	0.0004	0.0005										
Age 4-9 years			-0.37^a	-0.40^a	-0.25^a	-0.37^a						
			0.04	0.04	0.05	0.06						
Age greater than 9 years			-0.56^a	-0.63^a	-0.63^a	-0.85^a						
			0.05	0.06	0.08	0.09						
New firm rate$_{2\text{-digit SIC},t-1}$	0.05^b	0.12^a	0.05^b	0.12^a	0.01	0.08^b	0.03	0.11^a	0.04	0.14^a	0.07	0.08
	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.06	0.06
New firm rate$_{2\text{-digit SIC},t-1}$*Age 4-9 years					0.04	0.08						
					0.04	0.05						
New firm rate$_{2\text{-digit SIC},t-1}$*Age >9 years					0.14^b	0.08						
					0.06	0.07						
Delisting rate via acquisitions$_{2\text{-digit SIC},t-1}$	0.22^a	0.06^b	0.22^a	0.06^b	0.25^a	0.08^c	0.24^a	0.06	0.21^a	0.06^c	0.24^a	0.09^c
	0.02	0.03	0.02	0.03	0.03	0.04	0.03	0.04	0.03	0.03	0.04	0.04
Delisting rate via acquisitions$_{2\text{-digit SIC},t-1}$*Age 4-9 years					-0.05	-0.03						
					0.04	0.05						
Delisting rate via acquisitions$_{2\text{-digit SIC},t-1}$*Age >9 years					-0.02	-0.01						
					0.05	0.06						
Credit Spread$_{t-1}$	-0.70^a	-0.41^a	-0.68^a	-0.40^a	-0.68^a	-0.43^a	-0.85^a	-0.65^a	-0.64^a	-0.31^a	0.42^b	0.75^a
	0.05	0.06	0.05	0.06	0.05	0.06	0.07	0.08	0.07	0.08	0.18	0.18
High investment grade bond$_{t-1}$	1.22^a	0.73^a	1.22^a	0.73^a	1.26^a	0.47^a	1.26^a	0.46^a	1.29^a	0.80^a	1.03^a	0.87^a
	0.06	0.08	0.06	0.08	0.09	0.12	0.09	0.12	0.08	0.11	0.11	0.14

High investment grade bond$_{t-1}$*Age 4-9 years					0.02	0.32[b]						
					0.11	0.14						
High investment grade bond$_{t-1}$*Age >9 years					-0.24[c]	0.39[b]						
					0.14	0.18						
Low Investment grade bond$_{t-1}$	0.96[a]	0.72[a]	0.95[a]	0.71[a]	0.48[b]	0.42	0.46[b]	0.39	0.78[a]	0.56[a]	0.98[a]	0.83[a]
	0.11	0.14	0.11	0.14	0.21	0.26	0.21	0.26	0.16	0.21	0.16	0.2
Low investment grade bond$_{t-1}$*Age 4-9 years					0.29	0.12						
					0.25	0.27						
Low investment grade bond$_{t-1}$*Age >9 years					0.49[c]	0.41						
					0.26	0.34						
Return$_{t-1}$	0.03[c]	0.03	0.03[c]	0.03	0.05[c]	0.06	0.05[c]	0.06[c]	0.04[c]	0.03	0	0.02
	0.01	0.02	0.01	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03
Return$_{t-1}$ *Age within 4-9 years					-0.01	-0.03						
					0.04	0.05						
Return$_{t-1}$ *Age >9 years					-0.05	-0.04						
					0.04	0.05						
[Debt/Total Assets]$_{i,t-1}$	-1.28[a]	-1.36[a]	-1.25[a]	-1.34[a]	-0.91[a]	-0.86[a]	-0.90[a]	-0.85[a]	-1.50[a]	-1.69[a]	-1.21[a]	-1.66[a]
	0.12	0.15	0.12	0.15	0.2	0.24	0.2	0.25	0.2	0.26	0.22	0.29
[Debt/Total Assets]$_{i,t-1}$ *Age within 4-9 years					-0.59[b]	-0.82[b]						
					0.28	0.36						
[Debt/Total Assets]$_{i,t-1}$ *Age >9 years					-0.25	-0.73[c]						
					0.3	0.38						
[Capital Exp./Total Assets]$_{i,t-1}$	0.14	-0.18	0.09	-0.23	-0.84[b]	-0.92[c]	-0.80[c]	-0.86[c]	0.83[c]	1.29[b]	0.65	-1.21
	0.28	0.33	0.28	0.33	0.42	0.48	0.43	0.48	0.48	0.57	0.7	0.84
[Capital Exp./Total Assets]$_{i,t-1}$*Age within 4-9 years					1.67[b]	2.23[a]						
					0.65	0.76						
[Capital Exp./Total Assets]$_{i,t-1}$*Age >9 years					1.53[c]	-0.24						
					0.84	0.97						
[Operating-cash-flow/Total Assets]$_{t-1}$	1.22[a]	1.14[a]	1.25[a]	1.17[a]	1.47[a]	1.70[a]	1.49[a]	1.72[a]	1.47[a]	1.16[a]	0.60[a]	0.15
	0.09	0.13	0.09	0.13	0.15	0.21	0.15	0.21	0.16	0.19	0.19	0.27
[Operating-cash-flow/Total Assets]$_{i,t-1}$*Age within 4-9 years					0.01	-0.52[c]						
					0.21	0.29						
[Operating-cash-flow/Total Assets]$_{i,t-1}$*Age >9 years					-0.84[a]	-1.50[a]						
					0.24	0.34						
Merger Wave$_t$ (Yes=1 if deal is in 1995-2000)	0.24[a]	0.36[a]	0.25[a]	0.37[a]	0.40[a]	0.40[a]	0.33[a]	0.29[a]	0.24[a]	0.32[a]	0.18[b]	0.59[a]
	0.04	0.05	0.03	0.05	0.06	0.07	0.06	0.07	0.06	0.07	0.08	0.09
Merger Wave$_t$ *Age within 4-9 years					-0.17[b]	-0.12						
					0.07	0.09						
Merger Wave$_t$ *Age >9 years					-0.26[a]	0.15						
					0.09	0.12						
TQ$_{i,t-1}$	0.10[a]	0.09[a]	0.10[a]	0.09[a]	0.13[a]	0.10[a]	0.13[a]	0.10[a]	0.08[a]	0.06[a]	0.05[b]	0.10[a]
	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.03
TQ$_{i,t-1}$*Age within 4-9 years					-0.05[b]	-0.04						
					0.02	0.03						
TQ$_{i,t-1}$*Age >9 years					-0.08[a]	0						
					0.03	0.03						
Logged Total Assets$_{i,t-1}$	-0.05[c]	-0.03	-0.06[b]	-0.05	-0.38[a]	-0.24[a]	-0.40[a]	-0.25[a]	-0.13[a]	-0.04	0.42[a]	0.24[a]

	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.07
Logged Total Assets$_{i,t-1}$*Age within 4-9 years					0.25[a]	0.19[a]						
					0.06	0.07						
Logged Total Assets$_{i,t-1}$*Age >9 years					0.77[a]	0.43[a]						
					0.06	0.08						
Constant	-3.29[a]	-3.04[a]	-3.37[a]	-3.13[a]	-3.70[a]	-3.55[a]	-3.90[a]	-3.81[a]	-3.63[a]	-3.27[a]	-0.85	-0.52
	0.14	0.15	0.14	0.15	0.15	0.17	0.19	0.22	0.21	0.22	0.55	0.53
Chi-square	1904.14		1937.13		2254.04		1040.32		782.97		404.95	
Robust std. errors	Yes		Yes		Yes		Yes		Yes			
Number of Firms (panels) for clustering errors	6142		6142		6142		5791		4810		2368	
Number of observations	49511		49511		49511		14533		19442		15536	

Table 6. Cumulative abnormal returns around acquisition announcements by young and mature firms conditional on the method of payment and organizational form of the target

IPO and acquisition data are obtained from SDC Platinum. The IPO sample includes all initial public offerings in 1975-2008, excluding reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date is excluded. Acquisitions of the IPO firms are identified using the SDC M&A database and include all acquisitions announced in 1981-2012. Age refers to the deal year with respect to the IPO year. Method of payment is reported by SDC for deals that are classified as having disclosed the details of the transactions. We also provide data on acquisition and deals rates for deals which SDC classified as 'undisclosed' and provided no details of the method of payment. Target's organizational form is classified using the data available in SDC into private, public, subsidiary, and unknown. Cumulative abnormal returns (CARs) are calculated using the event window of [-1,+1]. Abnormal returns are calculated net of equally-weighted market portfolio. Rows have mean, median, standard deviation, and number of observations respectively. We use t-statistics to test for differences in mean CARs and a z-statistic for the Wilcoxon rank-sum (Mann-Whitney) test of differences in median CARs. We use superscripts [a, b, c] to denote statistical significance at the 1%, 5%, and 10% level, respectively.

All acquisitions

Target's organizational form	Event years: Young 1-3	Event years: Mature 10-20	Difference tests t-statistic [z-statistic]
[1] Private target	1.19%[a]	0.68%[a]	2.99[a]
	0.53%[a]	0.2%[a]	[3.78][a]
	11%	7%	
	8,262	3,970	
[2] Public target	-0.44%	-0.92%[a]	1.02
	-0.3%[b]	-0.6%[a]	[0.83]
	11%	8%	
	868	784	
[3] Subsidiary target	1.91%[a]	1.14%[a]	3.25[a]
	0.77%[a]	0.3%[a]	[3.17][a]
	10%	7%	
	3,081	1,892	
	Difference tests t-statistic [z-statistic]		
[1]-[2]	4.17[a]	5.32[a]	
	[5.55][a]	[6.14][a]	
[2]-[3]	-5.67[a]	-6.51[a]	
	[-6.73][a]	[-6.77][a]	
[1]-[3]	-3.22[a]	-2.39[b]	
	[-2.93][a]	[-1.94][c]	
Total	1.26%[a]	0.62%[a]	4.75[a]
	0.54%[a]	0.16%[a]	[5.51][a]
	11%	7%	
	12,211	6,646	

Sorted by the method of payment: Purely cash

Target's organizational form	Event years: Young 1-3	Event years: Mature 10-20	Difference tests t-statistic [z-statistic]
[1] Private target	1.09%[a]	0.72%[a]	1.17
	0.55%a	0.33%a	[1.65][c]
	9%	7%	
	1,612	1,004	
[2] Public target	1.25%[b]	-0.17%[a]	2.35[b]
	0.7%[b]	-0.05%	[2.48][b]
	9%	5%	
	250	372	
[3] Subsidiary target	1.57%[a]	1.02%[a]	1.72[c]
	0.99%[a]	0.34%[a]	[2.46][b]
	8%	6%	
	1,283	773	
	Difference tests t-statistic [z-statistic]		
[1]-[2]	-0.27	2.65[a]	
	-0.24	[2.34][b]	
[2]-[3]	-0.54	-3.50[a]	
	-0.81	[-2.91][a]	
[1]-[3]	-1.51	-0.96	
	[-1.99][b]	[-0.89]	
Total	1.3%[a]	0.67%[a]	3.01[a]
	0.71%[a]	0.27%[a]	[3.96][a]
	9%	6%	
	3,145	2,149	

Sorted by the method of payment: Purely stock

Target's organizational form	Event years: Young 1-3	Event years: Mature 10-20	Difference tests t-statistic [z-statistic]
[1] Private target	1.76%[a]	1.94%[b]	-0.19
	1.03%a	-0.09%	1.37
	13%	13%	
	979	238	
[2] Public target	-2.92%[a]	-2.35%[a]	-0.53
	-3.73%[b]	-1.39%[a]	[-1.26]
	13%	11%	
	298	196	
[3] Subsidiary target	5.44%[b]	3.87%[b]	0.54
	1.44%[b]	2.05%[b]	-0.88
	24%	10%	
	111	32	
	Difference tests t-statistic [z-statistic]		
[1]-[2]	5.35[a]	3.75[a]	
	[6.68][a]	[3.44][a]	
[2]-[3]	-3.46[a]	-3.23[a]	
	[-4.64][a]	[-3.55][a]	
[1]-[3]	-1.58	-0.98	
	[-0.65]	[-2.15][b]	
Total	1.05%[a]	0.27%	1.14
	0.35%	-0.48%	[1.70][c]
	15%	12%	
	1,388	466	

Table 7. Cumulative abnormal returns around acquisition announcements by young and mature firms conditional on the primary 2-digit SIC code relatedness, the method of payment and organizational form of the target

IPO and acquisition data are obtained from SDC Platinum. The IPO sample includes all initial public offerings in 1975-2008, excluding reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date is excluded. Acquisitions of the IPO firms are identified using the SDC M&A database and include all acquisitions announced in 1981-2012. Age refers to the year with respect to the IPO year. Method of payment is reported by SDC for acquisitions that are classified as having disclosed the details of the transactions. We also provide data on acquisitions for which SDC provides no details on the method of payment. The target's organizational form is classified using the data available in SDC into private, public, subsidiary, and unknown. Cumulative abnormal returns (CARs) are calculated using the event window of [-1,0,+1]. Abnormal returns are calculated net of equally-weighted market portfolio. Rows have mean, median, standard deviation, and number of observations respectively. We use t-statistics to test for differences in mean CARs and a z-statistic for the Wilcoxon rank-sum (Mann-Whitney) test of differences in median CARs. We use superscripts [a, b, c] to denote statistical significance at the 1%, 5%, and 10% level, respectively.

	All acquisitions								Purely Cash								Purely Stock							
	Related Deals		Unrelated Deals		Difference tests				Related Deals		Unrelated Deals		Difference tests				Related Deals		Unrelated Deals		Difference tests			
Target's organizational form	Event Year		Event Year		[a]-[b]	[c]-[d]	[c]-[a]	[d]-[b]	Event Year		Event Year		[a]-[b]	[c]-[d]	[c]-[a]	[d]-[b]	Event Year		Event Year		[e]-[f]	[g]-[h]	[g]-[e]	[h]-[f]
	1-3	10-20	1-3	10-20	t-statistic				1-3	10-20	1-3	10-20	t-statistic				1-3	10-20	1-3	10-20	t-statistic			
	[a]	[b]	[c]	[d]	[z-statistic]				[a]	[b]	[c]	[d]	[z-statistic]				[e]	[f]	[g]	[h]	[z-statistic]			
[1] Private Targets	1.05%[a]	0.6%[a]	1.44%[a]	0.85%[a]	2.55[a]	1.62	1.32	0.91	1.08%[a]	0.5%[b]	1.1%[a]	1.15%[a]	1.58	-0.08	0.04	1.32	1.26%[a]	2.02%[b]	2.64%[a]	1.82%	-0.74	0.45	1.51	-0.1
	0.58%[a]	0.15%[a]	0.45%[a]	0.28%[a]	[3.55][a]	[1.56]	[-0.62]	[0.5]	0.53%[a]	0.18%[c]	0.66%[a]	0.56%[a]	[1.65][c]	[0.46]	[0.1]	[0.99]	1.05%[a]	0.12%	0.89%[a]	-0.79%	[0.42]	[1.68][c]	[0.83]	[-0.9]
	0.09	0.07	0.15	0.09					0.08	0.07	0.10	0.08					0.12	0.11	0.14	0.16				
	5,219	2,696	3,043	1,274					995	671	617	333					626	139	353	99				
[2] Public Targets	-1.11%[a]	-1.03%[a]	0.75%	-0.63%	-0.14	1.65[c]	2.42[b]	0.61	1.73%[b]	-0.06%	0.48%	-0.47%	2.37[b]	0.93	-1.10	-0.72	-4%[a]	-3.23%[a]	-0.52%	-0.19%	-0.62	-0.16	2.14[b]	1.75[c]
	-0.72%[a]	-0.57%[a]	0.21%	-0.8%[b]	[-0.27]	[1.54]	[2.07][b]	[0.16]	1.11%[b]	-0.05%	0.26%	-0.04%	[2.42][b]	[0.98]	[-1.01]	[-0.21]	-4.15%[a]	-1.84%[a]	-1.14%	-0.68%	[-1.09]	[-0.8]	[1.83][c]	[2.01][b]
	0.11	0.07	0.11	0.08					0.09	0.05	0.09	0.05					0.13	0.10	0.13	0.11				
	557	565	311	219					154	271	96	101					205	139	93	57				
[3] Subsidiary Targets	2.08%[a]	1.24%[a]	1.61%[a]	0.92%[a]	2.90[a]	1.65[c]	-1.19	-0.98	1.85%[a]	1.19%[a]	1%[b]	0.61%	1.68[c]	0.7	-1.74[c]	-1.22	4.15%[c]	5.31%[c]	8.24%[c]	1.49%	-0.32	1.35	0.76	-1.24
	1%[a]	0.39%[a]	0.47%[a]	0.19%[b]	[3.4][a]	[0.92]	[-2.66][a]	-1.03	1.26%[a]	0.53%[a]	0.44%[b]	0.01%	[2.55][a]	[0.86]	[-2.82][a]	[-1.69][c]	0.78%	2.97%[b]	1.67%[b]	1.61%	[-1.21]	[0.32]	[1.08]	[-0.58]
	0.10	0.07	0.11	0.07					0.08	0.07	0.08	0.06					0.22	0.12	0.28	0.05				
	1,970	1279	1,111	613					861	540	422	233					76	20	35	12				
	Difference tests								Difference tests								Difference tests							
	t-statistic								t-statistic								t-statistic							
	[z-statistic]								[z-statistic]								[z-statistic]							
[1]-[2]	4.47[a]	4.81[a]	1.03	2.38[b]					-0.87	1.45	0.62	2.49[b]					5.03[a]	4.22a	2.04[b]	0.90				
	[5.62][a]	[5.2][a]	[1.7][c]	[3.24][a]					[-0.78]	[1.54]	[0.59]	[1.88][c]					[6.22][a]	[4.09][a]	[2.61][a]	[0.12]				
[2]-[3]	-6.15[a]	6.24[a]	-1.25	-2.46[b]					-0.17	-3.08[a]	-0.53	-1.73[c]					-3.01[a]	-3.06[a]	-1.78[c]	-0.77				
	[-7.04][a]	[-6.06][a]	[-1.74][c]	[-3.13][a]					[-0.61]	[-2.94][a]	[-0.29]	[-0.89]					[-3.86][a]	[-3.35][a]	[-2.49][b]	-1.20				
[1]-[3]	-4.02[a]	-2.88[a]	-0.42	-0.19					-2.02[b]	-1.84[c]	0.17	0.94					-1.11	-1.17	-1.17	0.15				
	[-3.47][a]	[-2.29][b]	-0.23	-0.13					[-2.79][a]	[-1.87][c]	[0.56]	[1.12]					[-0.11]	[-1.79][c]	[-1]	[-1.02]				
Total	1.16%[a]	0.58%[a]	1.43%[a]	0.72%[a]	3.97[a]	2.65[a]	1.21	0.69	1.46%[a]	0.65%[a]	1.01%[a]	0.72%[a]	3.29[a]	0.77	-1.34	0.21	0.31%	-0.21%	2.44%[a]	1.12%	0.67	1.01	2.51[b]	1.05
	0.61%[a]	0.14%[a]	0.44%[a]	0.18%[a]	[5.13][a]	[2.4][b]	[-1.3]	[0.02]	0.83%	0.24%	0.50%	0.28%	[3.99][a]	[1.37]	[-2.02][b]	[-0.32]	0.22%	-0.53%	0.48%	-0.02%	[1.08]	[1.4]	[2.12][b]	1.01
	0.09	0.07	0.14	0.08					0.08	0.06	0.09	0.07					0.14	0.11	0.16	0.14				
	7,746	4,540	4,465	2,106					2,010	1,482	1,135	667					907	298	481	168				

Figure 1. Post-IPO median value of the IPO cohort acquisition rate over the lifecycle
IPO and acquisition data are obtained from the SDC Platinum. The IPO sample includes all initial public offerings in 1975-2008, excluding reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date is excluded. Acquisitions of the IPO firms are identified using the SDC M&A database and include all acquisition deals announced in 1981-2012. Age refers to the year with respect to the IPO year. The acquisition rate is the total number acquisition announcements of an IPO cohort in year *t* divided by the number of firms alive from that cohort at the beginning of that year.

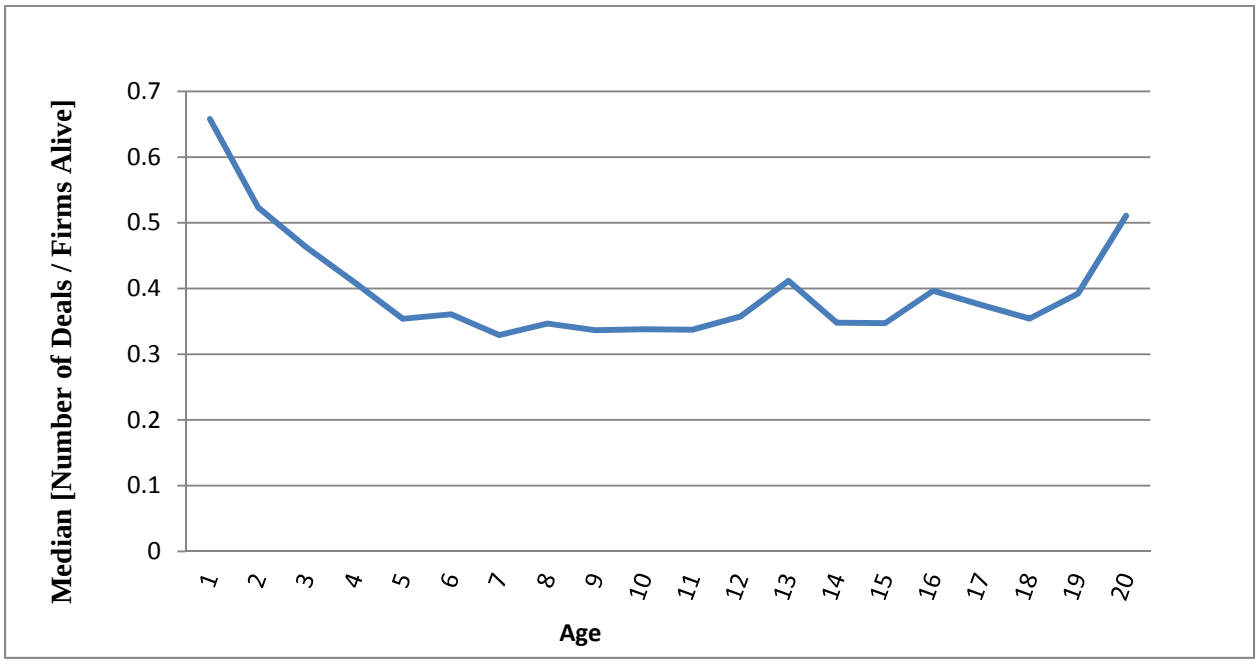

Figure 2. Post-IPO conditional acquisition rate per event-year by IPO-cohort

IPO and acquisition data are obtained from SDC Platinum. The IPO sample includes all initial public offerings in 1975-2008, excluding reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date is excluded. Acquisitions of the IPO firms are identified using the SDC M&A database and include all acquisition deals announced in 1981-2012. Age refers to the year with respect to the IPO year.. The conditional acquisition rate is the ratio of acquisitions of a given type in a year divided by the number of firms alive at the beginning of that year.

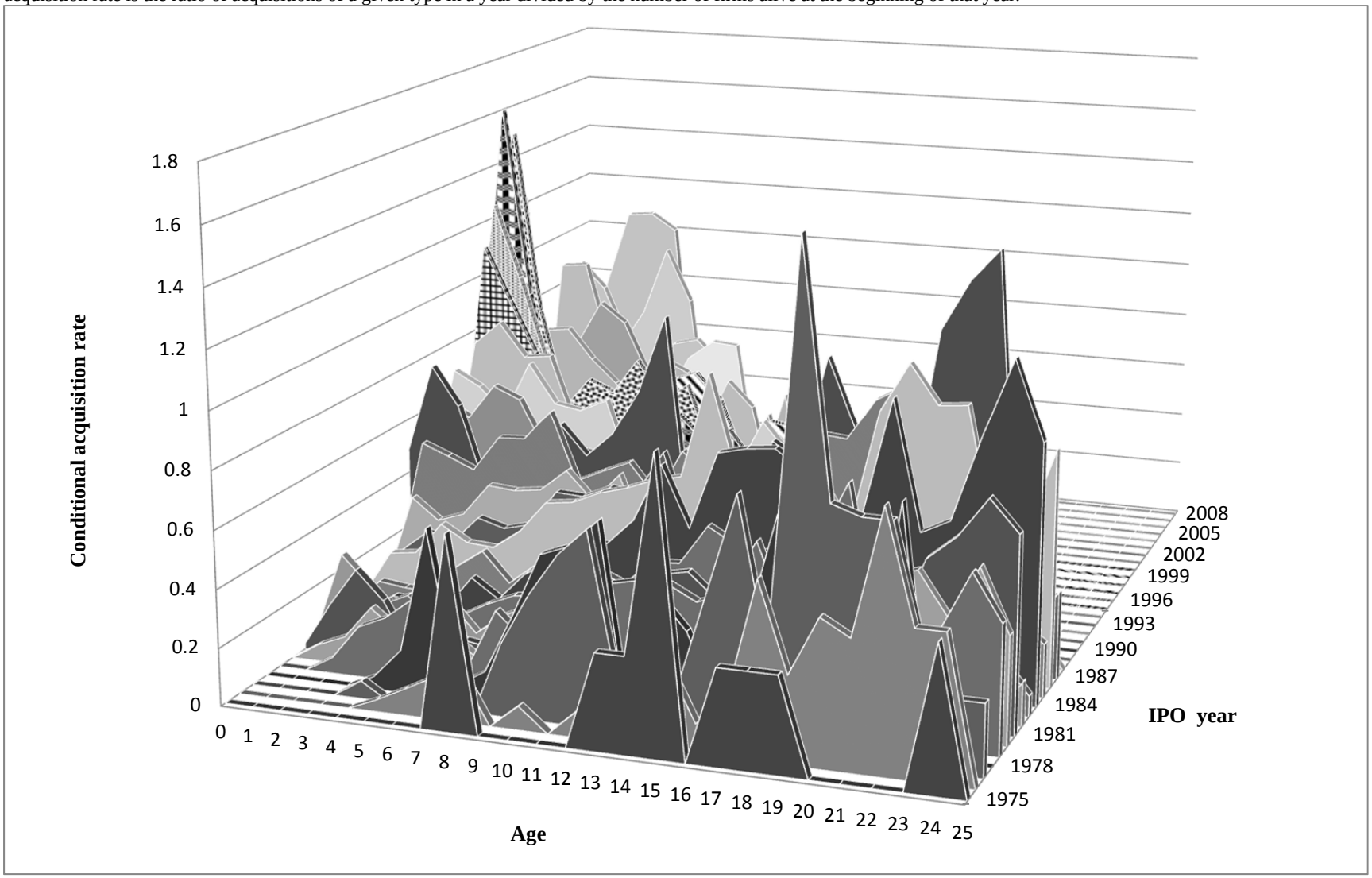

Figure 3. Post-IPO median value of the event-year conditional acquisition rate by the state of the IPO market and of the M&A market

IPO and acquisition data are obtained from the SDC Platinum. The IPO sample includes all initial public offerings in 1975-2008, excluding reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date is excluded. Acquisitions of the IPO firms are identified using the SDC M&A database and include all acquisition deals announced in 1981-2012. Age refers to the year with respect to the IPO year. The conditional acquisition rate is the ratio of acquisitions of a given type in a year divided by the number of firms alive at the beginning of that year. The IPO market is classified as hot (4th and 5th quintiles), cold (1st quintile), or neutral (2nd and 3rd quintiles) based on a quintile ranking approach to quarterly number of IPOs as the heat measure of IPO market following Yung, Colak and Wang (2008). The merger wave denotes the period from 1995 to 2000. IPO underpricing is calculated as the percentage initial return $(P_1-P_0)*100/P_0$, where P_1 is the first-day closing stock price or bid-ask average (from CRSP) and P_0 is the IPO offer price. The IPO underpricing quintiles are obtained using the 7,271 IPOs (out of 7,506) for which we have data.

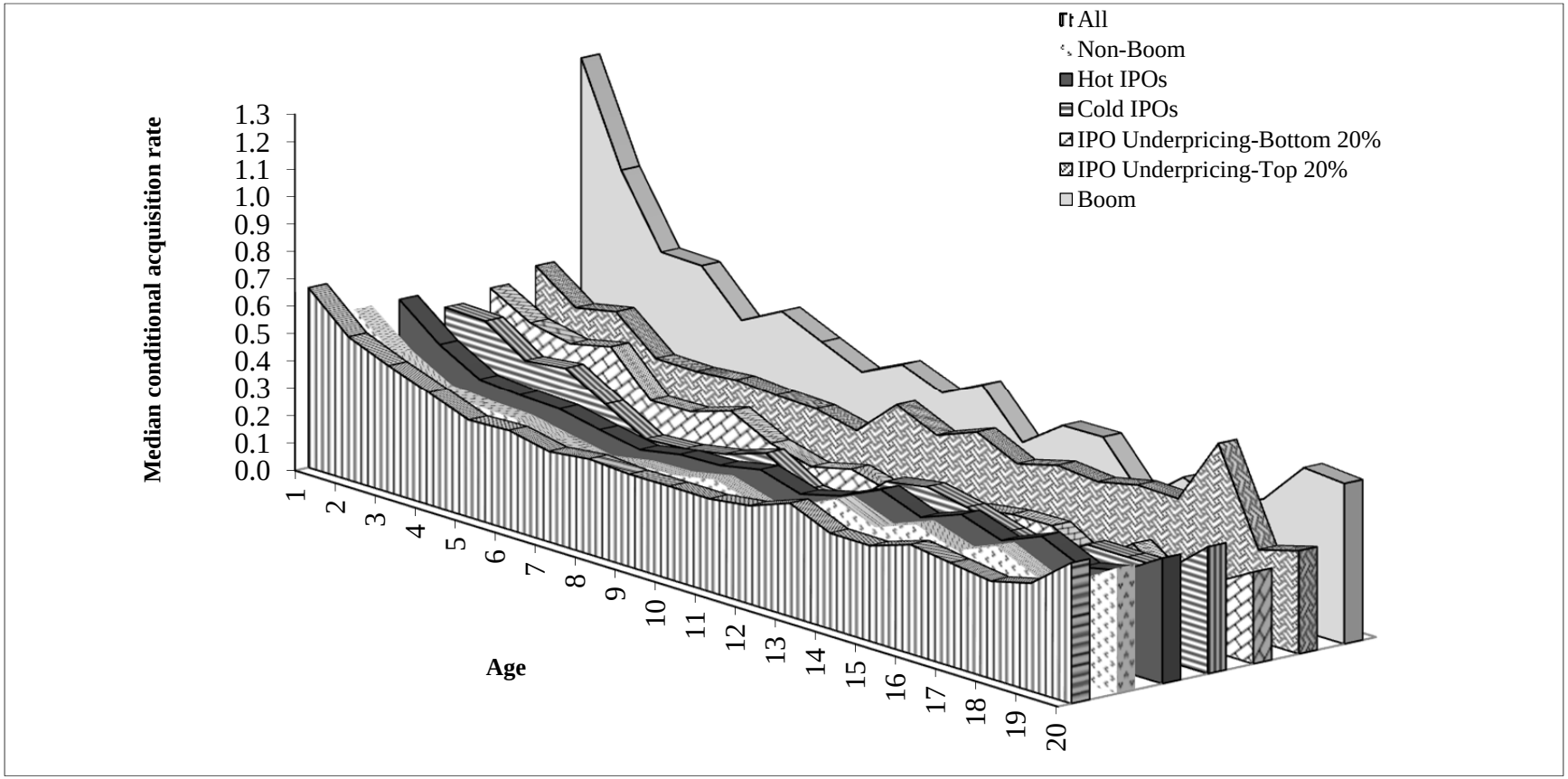

Figure 4a. Coefficient estimates of the age indicator variables in the regression presented in Table 3
This figure presents the estimates of the age indicator variables in the panel regression model which corresponds to regressions 1 and 7 in Table 3. The dependent variable is the conditional **acquisition rate** for IPO cohorts in year *t*. in regression 1 and the conditional acquisition rate for unrelated acquisitions in model 7.

Panel A. Related acquisitions (regression 1)

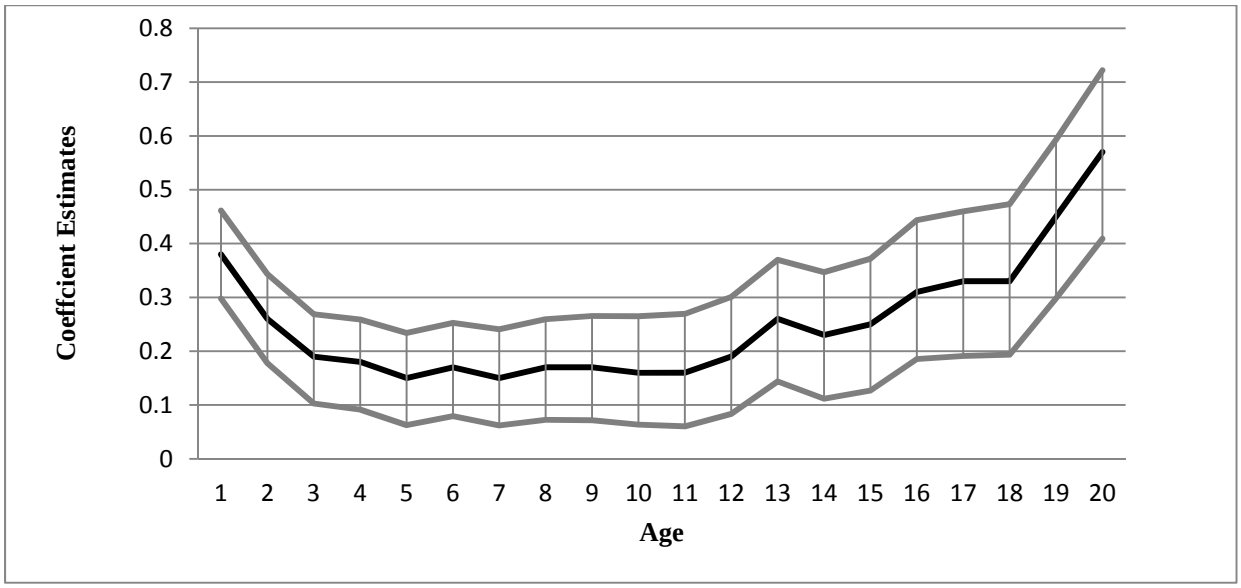

Figure 4b: Unrelated acquisitions (regression 7)

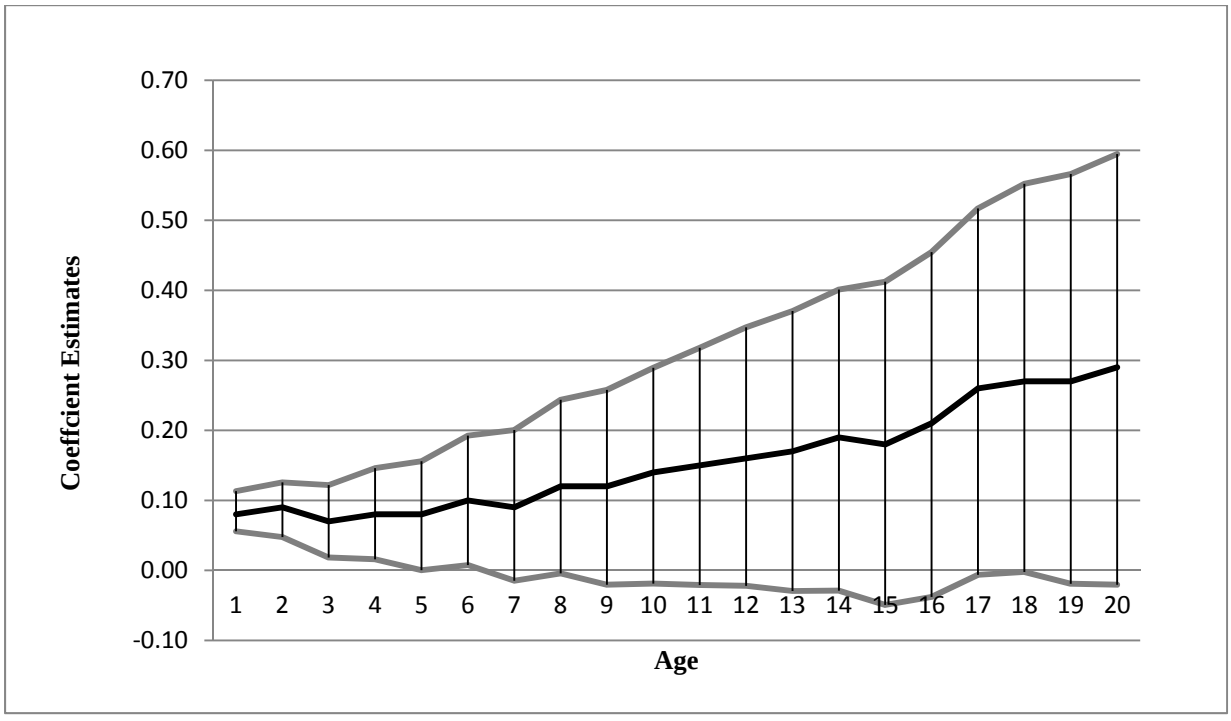

Figure 5. Average TQ over the lifecyle of the public firm

IPO and acquisition data are obtained from SDC Platinum. The IPO sample includes all initial public offerings in 1975-2008, excluding reverse LBOs, spinoffs, rights and unit offerings, ADRs, closed-end funds, and REITs. In addition IPO firms with trade data available in CRSP before their IPO announcement date are excluded. Acquisitions of the IPO firms are identified using the SDC M&A database and include all acquisitions announced in 1981-2012. Age refers to the number of years with respect to the IPO year. Tobin's Q, TQ_{t-1}, is calculated as [(common shares outstanding*fiscal yearend closing price)+ $Debt_{t-1}$)/$Total\ Assets_{t-1}$].