

# **Recombination and Variability as Organizations Grow\***

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## **Abstract**

Mergers among organizations produce recombinations, organizations with features that differ fundamentally from those of either parent organization. The complex interactions involved in such recombination may enhance organizational performance, resulting in accelerated future growth rates for the post-merger organization. But complex interactions are difficult to predictably manage, so despite our best efforts they often go awry. Consequently recombinations often backfire, resulting in poor performance and lower growth rates. In this light, we argue that mergers should be understood as variance-increasing events in the lives of organizations. We model of the consequences of merger in terms of the variance in future organizational growth rates among post-merger organizations, and find that in fact mergers among a population of commercial banks significantly increased this variance. The implications of these findings are explained, both in terms of the established literature on organizational mergers, and the somewhat newer literature on growth rate variability.

## **Recombination and Variability as Organizations Grow**

Mergers and acquisitions are common events in the lives of organizations. This fact is well known for diversified organizations, but mergers and acquisitions also are common among firms within a given industry. Such “horizontal” mergers, as they are sometimes called, are a way for organizations to grow fast – bringing in people and skills, customers and market position, products and brands with reputations, facilities and experienced operations – all more quickly than by building scale from the ground up. Mergers within an industry also are a way to eliminate rival organizations, and possibly to realize “synergies” where the newly merged organization is more valuable than the sum of its parents. Mergers and acquisitions have become so common that thriving populations of investments banks, law firms, accounting firms, and consulting organizations specialize in making them happen.

Oddly, given their frequency, mergers and acquisitions within an industry often harm the viability of participating organizations, so that the resulting organization is worse off than were its parents. This fact is perplexing especially when one considers that these events typically are conceived, designed, and executed in an effort to improve organizational viability. In this light, an applied research literature has blossomed, attempting to identify the factors that determine the success and failure of horizontal mergers and acquisitions. This literature is appropriately broad, featuring work from different perspectives looking at various possible predictors of success: such as the market relatedness of organizations, management experience with mergers, compatibility of cultures, strategies, or technologies, and the like.

In contrast to the applied literature on mergers and acquisitions, evolutionary theories of organizations have put little theoretical effort into understanding this key event. In particular, evolutionary theories of organizations have tended to focus on continuously changing features of organizations, such as their ages and sizes, or on discrete events such as strategic or technological change. These theories have had far less to say about mergers and acquisitions, even though these events are at least as common as strategic and technological changes. One reason for this failure might be that mergers and acquisitions are more difficult to think about from an evolutionary perspective; there is no clear biological analog to mergers, after all. In any case, to evolutionary theories of organizations, mergers and acquisitions remain little more than a nuisance – events that create coding problems as we collect data, identify failure events, and calculate organizational age.

In our view, there is much to be gained by explicitly building mergers and acquisitions into an evolutionary model of organizations. By joining and integrating the parts of two distinct organizations, mergers produce *recombinations* – organizational features that are fundamentally different from what existed in either of the parent organizations (Stark, 1996). Because mergers typically entail blending and integrating parts of the parent organizations, the resulting recombinations are more than the sum of the parts. Instead, the post-merger organization is characterized by complex interactions among the components that each of the parents brought to the merger. As interactions, such recombinations may be especially valuable if they work out well, leading to a future path of dramatically increasing performance and growth for the post-merger organization. On the other hand, interactions can and often do go awry, despite the best intentions. In

these cases, the recombinations resulting from merger are looked upon after the fact with regret, and managers often struggle for years downsizing and reorganizing in the wake of such failures.

By understanding mergers as recombinations that may trigger variability, we depart from the established literature in a constructive way. Currently, studies of mergers typically investigate what factors drive post-merger performance and growth *on average*. Thus, the established literature does look at the distribution of post-merger outcomes, but confines its attention to the first moment of that distribution – the mean. Our perspective, by contrast, leads us to focus as well on the second moment of the post-merger performance distribution, its variance, as we ask whether mergers increase the variability of organizational growth rates. Specifically, we model organizational mergers as a matching process, with the consequences of mergers depending on the complex interactions that are involved in such recombinations.

One particularly interesting form of variability appears in the growth rates of organizations (Stanley et al., 1996; Sutton, 1997, 2002). Explosive growth can launch an organization into a position of dominance, while decline can severely retard an organization's future development and prospects. Ordinarily, growth and decline are seen as opposing processes, likely to occur in very different situations or stages of organizational development. But understood as symptoms of underlying variability, the chances of growth and decline go hand-in-hand. The same actions that, if they work out well, lead to explosive growth may instead trigger decline. Engaging in a risky new venture, for instance, might generate explosive growth, but it might instead fail entirely and bring about stagnation. Attempts at changing an organization radically also might go

either way – leading to success and growth if all goes well but carrying the risk of hard times and future “downsizing” if things do not work out according to plan. More generally, dramatic strategic moves by organizations entail risk, and consequently are often a source of increased variability in organizational growth.

### **Do Mergers Improve Performance?**

If intentions were to work out as planned, one would expect that organizations merge when the consequence is likely to be improved performance (Bradley, Desai, and Kim, 1988).<sup>1</sup> Yet empirical research on mergers and acquisitions is mixed (e.g. Haspeslagh and Jemison, 1991; Roll, 1988; Sirower, 1997). As King, Dalton, Daily and Covin (2004) point out in their meta-analysis of the merger and acquisition literature, empirical research during past years failed to exhibit a consistent pattern on antecedents for predicting post-merger performance. Such an inconclusive result raises the possibility that mergers might be motivated by rationale other than organizational performance. A common line of argument is that mergers and acquisitions serve the interests of managers, rather than shareholders (Shleifer and Vishny, 1986; Gorton and Rosen, 1995; Ryan, 1999). Another possibility is that “managerial herding” might be responsible for the lower returns that often result from merger and acquisition activity (Healy et al., 1992). While we do not know for certain that non-performance-related criteria are involved in merger decisions, we do know that the relationship between merger and performance is mixed.

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<sup>1</sup> We restrict our focus to so-called “horizontal” mergers among organizations in (roughly) the same industry. We exclude, therefore, the large literature on vertical integration.

In response, various researchers have attempted to delineate the conditions under which mergers and acquisitions do improve performance. For instance, Mulherin and Boone (2000) report value improvements due to mergers and acquisitions in response to economic changes. Anand and Singh (1997), as well as Tremblay and Tremblay (1988), present evidence that improved performance may result from mergers and acquisitions that eliminate overlap and thus increase efficiency. Others argue that adding value through mergers requires that the parent organizations be compatible or related, either organizationally (Jemison and Sitkin, 1986) or strategically (Ramaswamy, 1997). Capron (1999) gives a short review of the related literature and finds that researchers mainly recognize two ways of enhancing revenue from merger and acquisition: increased market coverage and enhanced innovation capability. Greater market coverage again requires relatedness among the parent organizations, and can imply both a larger customer base and a richer bundle of products post-merger (Aaker, 1996; Srivastava, Shevani and Fahey, 1998). Increased market coverage also may imply better utilization of brand reputation, sales networks and marketing activities (Barney, 1991; Capron and Hulland, 1999; Srivastava et. al., 1998). In sum, it seems that a special set of circumstances needs to exist in order for mergers to yield performance improvements.

### **Mergers as Complex Recombinations**

Our own view is that mergers should be understood as complex “recombinations” – resulting in organizational features that are significantly different from those of the parent organizations from which they were created (Stark, 1996). Integrating the many different parts of merging organizations is a daunting task, because of the many ways that

the parts of two merging organizations may interact. It is well known that, in complex systems involving interactions, uncertainty over the consequences of interactions increases nonlinearly with the number of such interactions (Levinthal, 1997). Consequently, there is likely to be considerable uncertainty over the consequences of mergers, so that we may observe unanticipated, negative consequences. Ironically, such unanticipated consequences will be especially likely the more related the parent organizations, since more parts of these organizations are likely to interact as the organizations integrate during the merger process.

The more complex the recombinations resulting from mergers, the less one can predict their consequences – at least in terms of the mean level of post-merger performance. This state of affairs is consistent with the mixed results in the literature, and suggests that mergers should be thought of as part of the class of organizational behaviors that carry unanticipated consequences (Merton, 1936; March, 1981). If this is the case, then mergers will often go awry simply because of the uncertainty involved in complex recombinations, and despite the best of intentions, rather than because managers pursue goals other than performance. Of course, it will also be the case that sometimes these complex combinations will interact in a way that improves performance, perhaps dramatically so. Yet as complex recombinations, mergers will elude classification as either good or bad for performance based on characteristics that are observable *a priori*.

By this thinking, the consequences of mergers are predictable – but in terms of the *variance* in post-merger performance rather than the mean. The increased uncertainty brought on by mergers implies a wider range of observed performance levels. In some instances, this variance will manifest as superior performance that may appear consistent

with synergy theory. In other cases, however, especially poor performance will result, consistent with theories of goal displacement. Both of these manifestations will be predicted if we model the consequences of mergers in terms of the variance of performance.

### **Modeling the Consequences of Complex Recombinations**

In this study, we focus on growth as an indicator of organizational viability, and so we model the effects of mergers on the ongoing, future growth chances of organizations. We rely on a standard model that allows rates of organizational growth to vary at random and proportionate to size:

$$S_{t2}/S_{t1} = S_{t1}^{\theta} \exp[\beta'X]\varepsilon,$$

Where  $S$  denotes organizational size at a given time  $t$ ,  $X$  is a vector of variables thought to influence organizational growth rates,  $\theta$  and  $\beta$  are parameters to be estimated, and  $\varepsilon$  is an error term. This model lends itself to the research tradition surrounding what has become known as “Gibrat’s law,” which notes that random proportionate growth will produce skewed size distributions similar to those observed in reality (Gibrat, 1931). Classically, work in this tradition seeks to explain deviations from this baseline model (Ijiri and Simon, 1967). Typically, studies find  $\theta < 0$ , meaning that smaller organizations grow disproportionately fast (Barnett and Carroll, 1987; Hall, 1987; Evans, 1987a/b; Hannan, West and Barron, 1994; Sutton, 1997).

Our theory shifts the focus instead to  $\varepsilon$ , modeling its variance,  $\sigma_{\varepsilon}^2$ , in terms of observables. Existing research models  $\sigma_{\varepsilon}^2$  in terms of organizational size (Hymer and Pashigan, 1962; Singh and Washington, 1975; Hall, 1987; Stanley et al., 1996; Sutton,

2002). We use a somewhat more general approach, modeling  $\sigma_\varepsilon^2$  simultaneously with the mean growth rate using Harvey's (1976) multiplicative heteroscedasticity model. This approach allows us to estimate a multivariate specification of both the mean growth rate and of  $\sigma_\varepsilon^2$ , so that we can know whether the effects of mergers on  $\sigma_\varepsilon^2$  hold after other variables are controlled. In particular,  $\sigma_\varepsilon^2$  is likely to depend on organizational size, but also on organizational age – to the extent that with age organizations become more reliable (Stinchcombe, 1967; Hannan and Freeman, 1984). With these variables controlled, we expect that mergers trigger an increase in  $\sigma_\varepsilon^2$ , at least for a period of time.

### **Data on Chicago Bank Mergers in the 20<sup>th</sup> Century**

We investigate our ideas using data describing the life histories of all retail banks in Chicago and its surrounding areas from 1900 through 1993. This context is ideal for our study, because during this time these banks were not permitted to establish branches. (These laws were relaxed at the very end of the study period.) This restriction meant that merged banks in Chicago were required to consolidate operations and combine organizations into one physical establishment. Also, unlike most other industries, banks in Chicago could not grow into each other's neighborhoods of operation by establishing branch offices. Rather, they could try to attract business from adjacent areas of the metropolitan area, or they could merge with other banks and then consolidate the operations of both banks after the merger. Similarly, banks attempting to deal with changes in the human demography of Chicago could either change their location, or merge with another bank in another location and combine the merged organizations into a single bank.

The data were coded from paper copies of bankers' directories (Rand McNally and Thomson, various years). Only retail banks were included, with other types of financial institutes such as investment banks, credit unions and savings & loan associations excluded. The data include all the important events that these banks experienced over the study period, and include birth years for banks born before 1900. Importantly, every merger and acquisition was coded in the data. In some cases, mergers and acquisitions occurred as part of a bank failure, often with the involvement of regulatory authorities. In these cases, the data source identified the events as connected to bank liquidation, so we coded these as failures rather than M&As. Mergers and acquisitions for our purposes were thus confined to those that were not, in fact, regulated failure events.

The main study variables are measured as follows:

***Bank Size and Growth.***

Bank size is measured by a bank's total assets in a given year. Note that the parameters of growth models have been found to depend greatly on the size measure used (Evans, 1986). For banks, assets are widely thought to be a more appropriate measure of size than employees or financial flows. Size was recorded for the first and last year that each bank existed (or as of 1900 or 1993 for left- or right-censored banks, respectively), and then in (roughly) 5-year panels. The time between panels varied slightly in some cases due to the availability of the data source in some years but not others. The recorded asset values were adjusted to real dollars using the Consumer Price Index (CPI) published by the United States Bureau of Labor Statistics.

Growth was measured by annualizing the size change between any two panels. For purposes of model estimation, any size change that occurred as a direct result of merger and acquisition activity was dropped from the data. So the growth effects of mergers are estimated using information only on future changes in size in the wake of a merger, not the change in size due to the merger itself.

***Merger and acquisition events during past 10 years.***

This is a dummy variable with 0 indicating not having any such event during the past 10 years. We decided to use a 10-year window because we expect the effect of merger to endure, but to dissipate eventually. In the context of merger and acquisition, a 5-year window would be relatively short as many organizational consequences, can be very time consuming and take longer to occur.

In addition, several variables were taken from the census, and are included to control for the carrying capacity for banks. These variables include: the human population in the area, number of manufacturing establishments, number of retail establishments, number of wholesale establishments, average wage of manufacturing workers.

**Results**

The data on growth are described in Figures 1-3. It appears that growth rates, and variability in the growth rate, decline when plotted over either the age or the size of organizations. Figure 3 illustrates growth rates as a function of time since an organization's last merger event. It seems that variability is especially high early in the period following a merger, although the magnitudes are not as great as those observed on

the full dataset. This reflects the fact that, in general, mergers and acquisitions were more likely to be survived by older, larger organizations, and these are in the more stable regions of the distributions by age and size. This pattern suggests that age and size may operate to suppress the effects of merger. If so, our modeling approach is especially appropriate, since it allows the effects of merger on growth variability to be estimated while separately controlling for the variance effects of organizational age and size.

Table 1 shows estimates of seven different specifications of the model. The upper section of the table includes estimates of coefficients for effects on the mean of growth rates, while the lower section shows estimates of effects on the log of growth rate variance. For all models where the merger variable is included as a covariate to estimate mean of growth rates, none has a significant effect for this variable. In Model 7, by contrast, mergers significantly increase growth rate variance, consistent with our thinking. This higher level of variability implies that some banks do enjoy better long-term growth due to merger, yet others' growth prospects are damaged by merger.

Noteworthy also are the consistently negative effects of size and age on growth variability. Modeled together with age, however, the negative effect of size is reduced in absolute value, such that the size effect on variance falls to become nonsignificant (see Model 6). Yet when the merger effect is included in the variance function (Model 7), the size effect becomes more strongly negative and marginally significant. It appears, then, that age picks up some of the effects that would otherwise be attributed to size. Meanwhile, the positive effect of mergers on growth variance appears to suppress some of the negative size effect, such that the size effect does not appear significant until the

merger effect is controlled. So it appears to be necessary to estimate these effects simultaneously, as in Model 7, to obtain unbiased estimates.

Also worthy of discussion is the interplay between effects on the mean and variance of the growth rate. From Model 1 through 3, the effect of size on the mean is significant and negative, the commonly-observed violation of Gibrat's law. Yet once the effects of age or size are controlled in the variance term, the effect of size on the mean growth rate falls by an order of magnitude, becoming nonsignificant (see Models 4 through 7). If this pattern were to hold in other datasets, the decades old question of why smaller organizations grow disproportionately fast would have a very different answer. Namely, smaller (and younger) organizations are more variable in their growth rates. Once this is accounted for in the model, the on-average effect of being a small organization falls away.

Finally, in Table 2 we re-estimate the full model with various specifications of organizational age, in order to be sure that our finding on the effects of mergers is robust. Indeed, even with a piecewise age effect, the merger effect persists. Regardless of specification, we find that mergers significantly increase the variance in growth rates going forward.

## **Discussion and Conclusion**

Mergers and acquisitions among organizations open up great possibilities for future growth, but we find that they are just as likely to trigger decline in the resulting organization. This result is consistent with the view that mergers produce organizational recombinations of uncertain value when viewed *a priori*. If all goes according to plan,

then the organizational capabilities of the parents will combine in ways that are value enhancing. Among these Chicago banks, one bank's superior knowledge of local businesses might have combined with another bank's well-established reputation. Alternatively, one bank's approach to organization operations or their lending decisions might have directly conflicted with the other's, making the resulting organization worse off when the incompatibility surfaced during the merger process. In these ways, we found organizational recombinations to be variance-enhancing events.

Our findings suggest that the literature on mergers and acquisitions should consider the possibility that the existing mixed results in the empirical record might be due to our failure to consider the variance effect of mergers. It is even possible that, as was the case in our results, mergers will have little or no effect on the average future prospects of the combined organization once the variance consequences of mergers is allowed for in the model. Should this be the case, then the well established industry fostering mergers and acquisitions should consider the implications of increased variance, essentially an aspect of risk, when valuing the advisability of this strategic move. It may be that, although slower to materialize, "organic" growth generated without mergers and acquisitions may be a more advisable strategy than growth through mergers in many situations.

A more general implication of our paper is that variability should more often be the explicit focus of research on organizations, following Sørensen (2002). After all, a recurring theme in research on organizations is that variability is important to the long-term development of organizations and industries. New possibilities are revealed when entrepreneurs attempt the unthinkable, and although many of these experiments go awry

the successes can transform industries and economies (Schumpeter, 1939; Nelson and Winter, 1982). Established firms, too, sometimes “learn” by exploring untried possibilities, increasing the chances of genius – and folly – as a result (March, 1991). Such variability is fundamental to evolutionary and ecological models of organizations, providing the variation on which selection processes operate (Aldrich, 1999; Carroll and Hannan, 2000). Variability among organizations also plays an important role in labor markets, increasing the variety of opportunity and so enhancing mobility chances in the labor force (Hannan, 1988; Sørensen and Sorenson, 2004). Within organizations, as well, variability is important, as when cultural variability affects the way that organizations operate (Harrison and Carroll, 2006; O’Reilly and Chatman, 1996). Given all the attention paid to variability in theory, or as an independent variable, we think that much could be gained by making it the primary focus of some research.

To conclude, the results from this analysis show the value of understanding mergers as complex recombinations. Such events do have predictable consequences, but in terms of the variability of performance rather than the mean. Focusing on the mean, existing research has been inconclusive, leading to speculation about the conditions under which mergers are or are not value enhancing. Our findings suggest a very different view. Mergers trigger complex interactions; sometimes these enhance performance, and sometimes they backfire – the best intentions of managers notwithstanding. After the fact, we can try to sort out the successes and failures according to rationale that seems apparent only after the fact. Our theory, instead, explains both extremes as indicative of a single process – increased variability in performance due to the complex recombinations that are created by mergers.

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**Table 1: Results of Model Estimation**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>	<b>Model 6</b>	<b>Model 7</b>
<b>Mean</b>							
Natural Log (Assets)	-0.025*** (0.00398)	-0.0103*** (0.00393)	-0.0106*** (0.00395)	-0.00151 (0.0031)	-0.00281 (0.00289)	-0.00143 (0.00274)	-0.00119 (0.00282)
Natural Log (Age)		-0.0375*** (0.00399)	-0.0374*** (0.00398)	-0.033*** (0.00362)	-0.0288*** (0.00341)	-0.0296*** (0.00336)	-0.0305*** (0.00335)
Have M&A in Past 10 Years			0.00787 (0.0137)	0.00609 (0.0147)	0.00974 (0.0117)	0.00924 (0.0125)	0.00953 (0.0131)
Local Density/10,000	-3.51 (6.07)	-3.86 (6.48)	-3.88 (6.46)	-4.60 (4.78)	-0.886 (2.42)	-1.85 (3.14)	-1.85 (3.26)
Natural Log (Rival Assets)/10,000	4.55 (10.02)	4.79 (10.07)	4.81 (10.06)	2.52 (5.62)	-0.696 (3.41)	0.335 (3.85)	0.671 (3.93)
Total Number of Birth Events/1,000	-1.04*** (0.438)	-1.21*** (0.446)	-1.22*** (0.447)	-1.33*** (0.514)	-1.11** (0.446)	-1.19** (0.482)	-1.16** (0.489)
Total Number of Death Events/1,000	-13.36*** (2.86)	-14.16*** (2.97)	-14.16*** (2.97)	-13.54*** (2.53)	-15.46*** (2.04)	-14.95*** (2.27)	-15.24*** (2.31)
Constant	0.448 (0.508)	0.402 (0.494)	0.413 (0.494)	-0.112 (0.286)	-0.164 (0.247)	-0.205 (0.249)	-0.151 (0.253)
<b>Variance</b>							
Natural Log (Assets)				-0.251*** (0.0386)		-0.109 (0.0752)	-0.133* (0.0764)
Natural Log (Age)					-0.551*** (0.0567)	-0.387*** (0.115)	-0.359*** (0.115)
Have M&A in Past 10 Years							0.732** 0.325
Constant	-5.03*** (0.0913)	-5.14*** (0.101)	-5.14*** (0.102)	-0.788 (0.687)	-3.78*** (0.194)	-2.30** (1.09)	-1.98** (1.10)
Log Likelihood	1419.96	1490.91	1491.18	1582.24	1599.44	1607.93	1616.68

\* p&lt;=0.1, \*\* p&lt;=0.05, \*\*\* p&lt;=0.01

Note: Age 0-1 is set as reference category for age effect.

**Table 2: Estimation of the Full Model with Different Specification for Age**

	<b>Model 8</b>	<b>Model 9</b>	<b>Model 10</b>
<i>Mean</i>			
Natural Log (Assets)	-0.00445** (0.00219)	-0.00219 (0.00259)	-0.00473*** (0.002)
Age 1-2	-0.108*** (0.041)		-0.0982** (0.0437)
Age 2-3	-0.153*** (0.0408)		-0.143*** (0.0438)
Age 3-5	-0.195*** (0.0393)		-0.184*** (0.0424)
Age 5-10	-0.218*** (0.0391)		-0.206*** (0.042)
Age 10-15	-0.245*** (0.04)		-0.234*** (0.0427)
Age 15-20	-0.256*** (0.039)		-0.245*** (0.0418)
Age 20-25	-0.247*** (0.0395)		-0.235*** (0.0426)
Age 25-30	-0.27*** (0.0407)		-0.259*** (0.0433)
Age 30-40	-0.26*** (0.0394)		-0.248*** (0.0422)
Age 40	-0.259*** (0.0403)		-0.246*** (0.0432)
Natural Log (Age)		-0.0282*** (0.003)	
Have M&A in Past 10 Years	0.0108 (0.0128)	0.00707 (0.0127)	0.00922 (0.0126)
Local Density/10,000	-2.94 (3.61)	-1.43 (2.62)	-2.28 (2.51)
Natural Log (Rival Assets)/10,000	5.34 (7.11)	-5.91 (4.76)	-3.41 (4.84)
Total Number of Birth Events/1,000	-1.39*** (0.501)	-1.2*** (0.393)	-1.33*** (0.401)
Total Number of Death Events/1,000	-15.02*** (2.42)	-15.61*** (1.91)	-15.51*** (1.96)
Constant	0.0864 (0.25)	-0.0625 (0.217)	0.161 (0.219)

\* p<=0.1, \*\* p<=0.05, \*\*\* p<=0.01

Note: Age 0-1 is set as reference category for age effect.

**Table 2 (cont.): Estimation of the Full Model with Different Specification for Age**

	<b>Model 8</b>	<b>Model 9</b>	<b>Model 10</b>
<i>Variance</i>			
Natural Log (Assets)	-0.161** (0.0769)	-0.172*** (0.0623)	-0.193*** (0.0628)
Age 1-2		-1.14*** (0.301)	-0.968*** (0.341)
Age 2-3		-1.83*** (0.29)	-1.44*** (0.347)
Age 3-5		-1.89*** (0.306)	-1.326*** (0.358)
Age 5-10		-2.39*** (0.282)	-1.754*** (0.322)
Age 10-15		-1.72*** (0.479)	-1.147*** (0.495)
Age 15-20		-2.07*** (0.347)	-1.528*** (0.379)
Age 20-25		-2.35*** (0.458)	-1.724*** (0.486)
Age 25-30		-1.79*** (0.542)	-1.227*** (0.535)
Age 30-40		-2.69*** (0.388)	-2.064*** (0.401)
Age 40		-2.22*** (0.434)	-1.572*** (0.444)
Natural Log (Age)	-0.237** (0.116)		
Have M&A in Past 10 Years	0.675** (0.328)	0.675** (0.305)	0.608** (0.307)
Constant	-1.92* (1.12)	-0.267 (0.922)	-0.528 (0.996)
Log Likelihood	1672.51	1661.68	1701.04

\* p<=0.1, \*\* p<=0.05, \*\*\* p<=0.01

Note: Age 0-1 is set as reference category for age effect.

**Fig.1 Distribution of Growth Rates (by Size)**

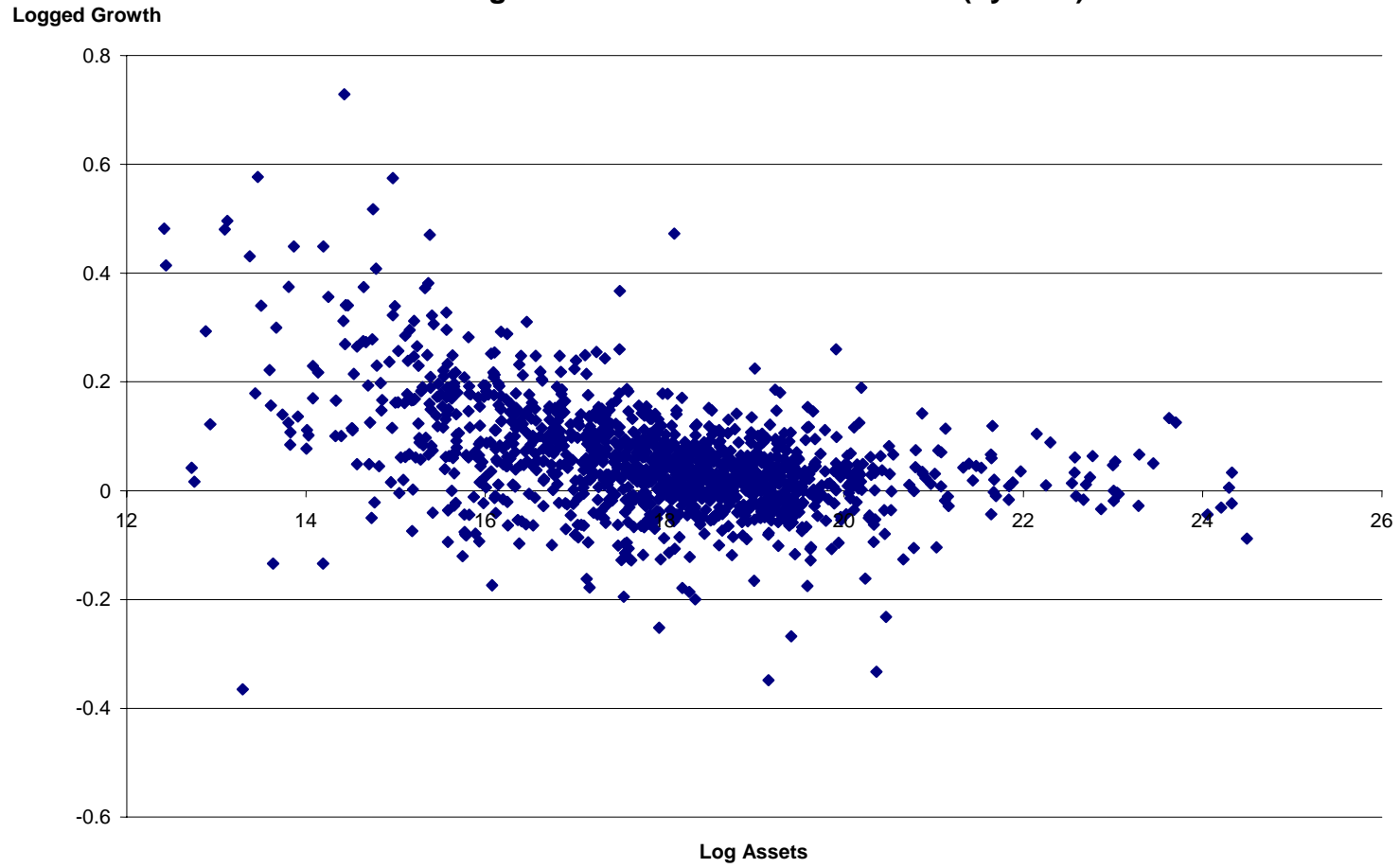
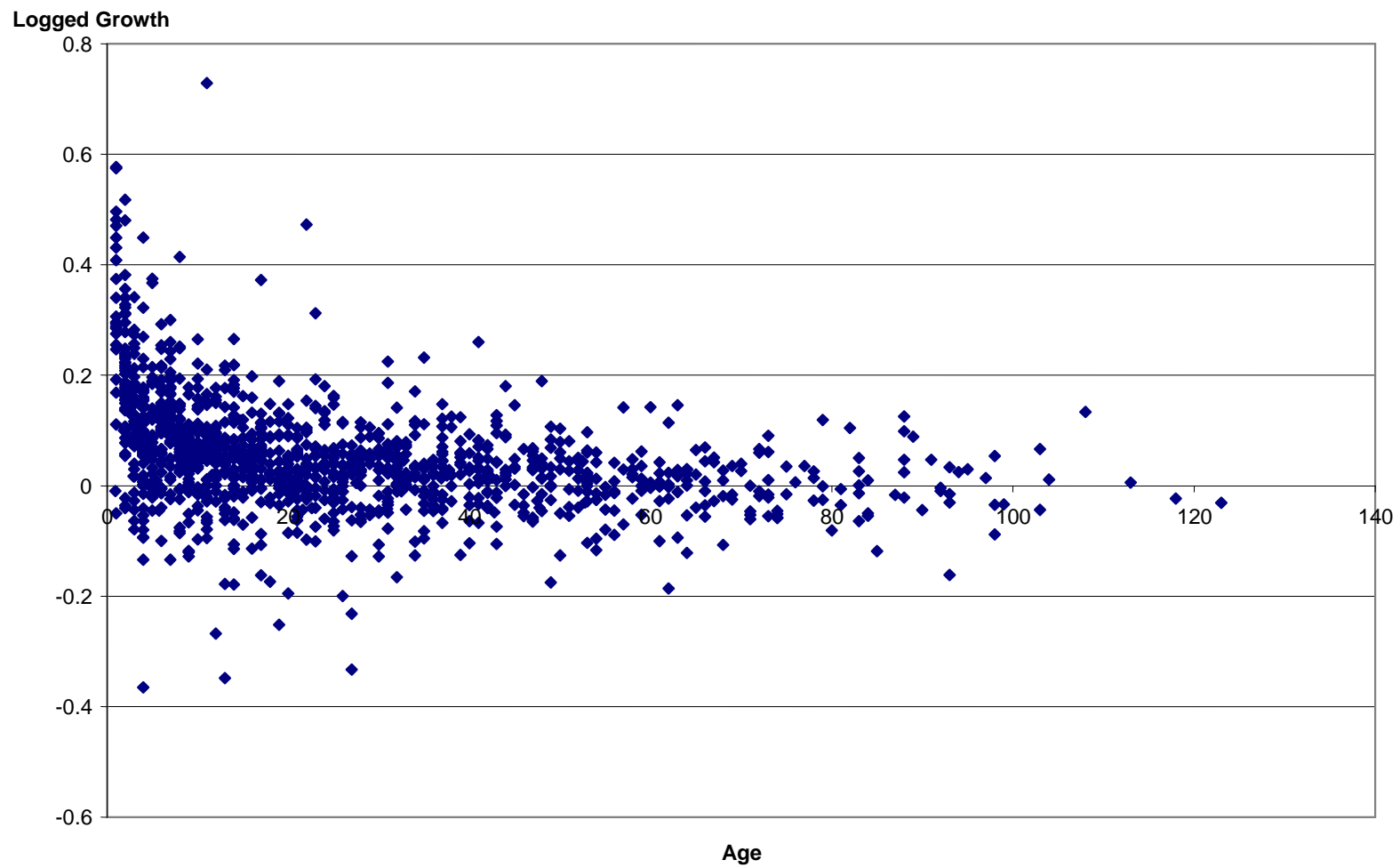


Fig. 2 Distribution of Growth Rates (by Age)



**Fig. 3 Distribution of Growth Rates (by Time Since Last M&A)**

