Industry Structure and the Conglomerate "Discount": Theory and Evidence

Timothy R. Burch[a]

Vikram Nanda[b]

M.P. Narayanan[b]

August, 2000

[a]University of Miami.
[b]University of Michigan.

Contact author: M. P. Narayanan
University of Michigan Business School
Ann Arbor, MI 48109-1234
Ph: (734) 763-5936
email: mpn@umich.edu

We thank participants at the finance workshops at the University of Michigan, Oxford University and London Business School, and at the 2000 Western Finance Association in Sun Valley and the SIRIF conference in Edinburgh for their comments.

Industry Structure and the Conglomerate "Discount": Theory and Evidence

ABSTRACT

Recent literature has been largely negative in its assessment of corporate diversification. Diversified firms have been regarded as destructive of firm value, prone to agency problems and divisional rent-seeking. The empirical finding that multi-division firms tend to trade at a 'discount,' or negative 'excess value', relative to their single-segment counterparts, is claimed in support of this view. Our paper offers a different, more positive perspective. We develop a simple, industry-based model in which conglomeration (and discounts) reflect an endogenous, value-*enhancing* response to industry conditions and agency problems prevalent in *all* firms, not just conglomerates. With managers reluctant to reduce assets under control, the conglomerate structure emerges as one in which managers act optimally and shift resources between divisions, in response to industry conditions. The model also provides a framework, with testable implications, to analyze patterns of conglomeration and excess values across different environments. The degree of conglomeration in an industry is predicted to have an inverse relation to the excess values of conglomerates and to the investment opportunities in the industry. Using a panel data set of fifty of the largest US industries, over 1978-1997, we find significant empirical support for the model's predictions.

Industry Structure and the Conglomerate "Discount": Theory and Evidence

I. Introduction

Why do firms conglomerate? And what determines the 'discount' at which they trade, relative to their single-segment counterparts?[1] These and related issues have attracted substantial attention, and some controversy, in the recent literature. With some exceptions, the literature has been negative in its assessment of conglomeration, with conglomerate discounts being attributed to a variety of agency problems such as rent seeking at the divisional level or empire building by top management.[2]

Viewed as a measure of agency costs, the evidence on conglomerate discounts is disconcerting. A destruction of 10-15% of the value of US conglomerates, the size of the average discount, suggests a staggering loss of value that runs into the hundreds of billions of dollars. Discounts of this magnitude would seem to indicate a largely ineffective market for corporate control. But do they? A more benign interpretation of the same evidence is that the discounts reflect characteristics of firms that choose to conglomerate, rather than inefficiencies stemming from the organizational form itself.[3] Which interpretation has greater empirical validity can be important to our understanding of organizational design and restructuring issues. It can also be relevant for policy actions. Surely, if conglomeration is responsible for large dead-weight losses, there may be a reasonable case for discouraging such combinations.

---

[1] Berger and Ofek (1995) and other papers document that conglomerates exhibit negative excess values of 10-15% on average.

[2] See Rajan, Servaes, and Zingales (2000), and Scharfstein and Stein (2000) for models of rent-seeking by divisional managers within multi-division firms. Jensen (1986) analyzes the incentives of management to misuse 'free cash-flow' in acquisitions and over-investment.

[3] There is some empirical support for this view, as we discuss later. Hyland (1999) and Chevalier (1999), for instance, find that conglomerate divisions exhibit performance and investment patterns similar to what they exhibited as independent firms prior to conglomeration.

The paper has two primary objectives. The first is to argue that the existence of conglomerate discounts is consistent with an equilibrium approach in which diversification enhances firm value, though conglomerates may appear 'discounted'. The discounts reflect the weaker competitive position of firms that choose to diversify into other industries. The second objective is to develop the model's predictions and test its ability to account for broad patterns in conglomeration and discounts across industries and time.

We propose a simple, industry-based model in which a firm's decision to diversify is endogenously determined. In the model, conglomeration emerges as a value-enhancing response to agency problems prevalent in all firms, not just conglomerates. This setting is unlike that of some recent papers, wherein information and incentive problems tend to be exacerbated within the conglomerate structure.[4] The agency problem we consider is of a familiar variety, with managers reluctant to reduce assets under their control. Conglomeration adds value by providing managers with alternative investment avenues, allowing them to shift resources away from an industry when conditions become unfavorable. In this setting, it is the weaker firms, less able to respond to industry shocks, that benefit from diversification. Hence, conglomerates can appear 'discounted' in equilibrium, even though the organizational form results in lower agency costs and enhances firm value.

Casting the model at the industry level allows us to analyze the firm's benefit from diversifying in the context of the competitive environment and industry risk it faces. It also provides a framework by which to analyze broad patterns in conglomeration and discounts, as conditions vary across industries and time. The variation through time in these variables can be seen in figures 2, 3 and 4. Our model sheds light on these cross-industry and time-series patterns.

[4] Stein (1997) and Matsusaka and Nanda (2000) are examples of papers in which the nature of the agency problem itself is unaffected by conglomeration. See also references in footnote 2.

The model starts with the premise that some firms in an industry, termed 'innovative' firms, have superior skills at adapting to shocks or responding to new opportunities that might affect the profitability of the industry. These shocks could be due to a variety of causes: technological changes (*e.g.*, the effect of personal computers on mainframes), innovations in marketing and distribution (*e.g.*, the impact of Amazon.com on the distribution of consumer items), or regulatory changes (*e.g.*, in the communications and utility industries). The greater the ability of the innovative firms to respond to these shocks, the more adverse the impact on the non-innovative firms.

The second premise is that capital markets ration investment capital. This is because managers, inclined to increase assets under control, prefer to make sub-optimal investments rather than returning capital to investors. Other than this, managers have incentives aligned with those of shareholders and capital is allocated to its highest-valued uses. Rationing can be regarded as the market's response to the inability of investors, through contracts or otherwise, to induce managers to return capital that cannot be profitably invested. In this scenario, conglomeration and internal capital markets can play an important and positive role.

Conglomeration provides managers with the ability to move resources among segments in response to industry conditions. Because non-innovative firms are less able to cope with industry shocks, shareholders may benefit from a conglomerate structure being adopted. This structure creates an internal market that allows capital to flow to its highest-valued use among segments. The incentive for non-innovative firms to conglomerate and (potentially) allocate capital to other industries is offset, however, by the fact that, as more non-innovative firms diversify, the ones that remain focused experience an increase in their profits due to reduced competition. In equilibrium, conglomeration proceeds to the point where the remaining non-innovative firms are indifferent between remaining single-segment firms and diversifying.

In this setting, conglomerates will tend to be valued at a discount relative to the value imputed from single-segment firms in the industries in which they are present. The reason is that, in equilibrium, the market value of a conglomerate will reflect the market values of single-segment, non-innovative firms of which it is constituted. The value of a focused, non-innovative firm is lower, however, than the value of an innovative firm in its industry. Since single-segment firms include both innovators and non-innovators, conglomerate firms (consisting only of non-innovators) will tend to be valued at a discount relative to their single-segment counterparts.

The model provides testable predictions about the relation between industry characteristics and the prevalence of conglomerates and their excess values. First, the magnitude of the conglomerate discount is predicted to be greater (*i.e.*, the excess value is lower) when a conglomerate has divisions in industries with a greater degree of conglomeration. Non-innovative firms facing larger industry shocks have greater incentive to diversify. It is precisely in an environment of large shocks, however, that *innovative* firms in an industry will tend to be valued at their highest, relative to non-innovative firms. This, as we show, implies a negative relation between the degree to which an industry is conglomerated and the excess value of its conglomerates.

The model also predicts an inverse relation between the degree of conglomeration and the investment opportunities in the industry, for which we use the market-to-book ratio of single-segment firms as a proxy. The intuition is that, other factors being the same, better industry prospects reduce the incentives for non-innovative firms to diversify. They are less likely to need an internal market through which to reallocate resources to another industry.

These predictions provide a useful test of the empirical viability of the model – in particular, the notion that conglomerate discounts may not be inconsistent with shareholder wealth maximization. As we argue in the paper, the intuition for these predictions is more robust than might appear from the formal model presented. At the same time, predictions such as these, relating discounts to levels of conglomeration and other industry characteristics, do not follow in any obvious manner from alternative, darker views on conglomerate efficiency. Arguments about the value loss from conglomeration are usually made in the context of the agency problems at the level of individual managers and firms, leaving the relation between discounts and industry characteristics ambiguous.

Our empirical analysis of the model's predictions is based on annual data from 50 of the largest U.S. industries, in terms of the total number of conglomerate segments and single-segment firms. We track these industries from 1978 to 1997, constructing a panel of conglomeration levels and industry excess values derived from excess values of conglomerates with segments in the industry. Essentially, we calculate the excess values for conglomerate firms as in Berger and Ofek (1995). These are then used to compute excess values associated with each industry in two alternative ways. One method relies on the excess values of conglomerates operating in an industry, weighted to account for the conglomerate's assets in the industry, relative to industry size and the conglomerate's other assets. The second approach is based on estimates from regressing conglomerate excess values on the divisional assets devoted to various industries. The two approaches yield very similar results.

On the basis of pooled, cross-sectional time series regressions, we find strong support for the predicted negative relation between the degree of conglomeration in an industry and both the industry excess value and the market-to-book ratio of single-segment firms in the industry. The results are robust to a variety of alternative specifications.

We now briefly describe the relation of the paper to the existing literature. While several explanations have been offered for why firms diversify, a rationale that has drawn attention lately is based on the benefits of an internal capital markets in efficient resource allocation (e.g. Billett and Mauer (1998), Stein (1997), and Williamson (1975)). Our paper draws upon similar motives for conglomeration. Various other explanations for conglomeration have been proposed as well. Among these are the lowering of financial distress costs through diversification, building deep pockets to prey on rivals (Bolton and Scharfstein (1990) and Montgomery (1994)), moral hazard (Jensen (1986) and Shleifer and Vishny (1989)), managerial risk aversion (Amihud and Lev (1981)) and mitigation of moral hazard due to correlated signals of managerial effort in diversified firms (Aron (1988)).

There is a growing literature on why conglomerates are discounted relative to single-segment firms. Scharfstein and Stein (2000) develops a model to explain investment distortions and loss of value within the conglomerate structure. In their model, corporate headquarters distorts investments toward less productive divisions to reduce rent-seeking behavior. With somewhat similar objectives, Rajan, Servaes, and Zingales (2000) offers a model based on cost of divisional diversity. In dealing with divisions with diverse resources and prospects, headquarters may reallocate resources to reduce diversity and enhance inter-divisional cooperation. Two recent papers have taken a more positive view of conglomeration. Fluck and Lynch (1999) suggest that a conglomerate merger allows marginally profitable projects to obtain funding and survive a period of distress. Since these projects are only marginally profitable, diversified firms are less valuable than single-segment firms. Matsusaka (2000) argues that firms with broad organizational capabilities use diversification as part of a dynamic value-maximizing strategy to seek good matches for their capabilities. Diversified firms are those still in search of a good match and are, therefore, valued at a discount.

The notion that conglomerate discounts may reflect characteristics of firms that choose to conglomerate finds support in recent empirical studies by Hyland (1999), Campa and Kedia (1999) and Chevalier (1999). They find that for firms that become part of a conglomerate, the investment patterns and other characteristics as a conglomerate division are similar to those of the stand-alone firm prior to conglomeration. Graham, Lemmon and Wolf (1999) find that target firms in conglomerate mergers tend to be discounted prior to acquisition. This empirical finding is consistent with the predictions of our model.[5]

The rest of the paper is as follows. The basic model is described in Section II, while Section III presents the model analysis. This is followed by a description of the testable

---

[5] The empirical evidence on capital misallocation in conglomerates as the source of discount has been mixed. While Rajan, Servaes, and Zingales (2000) and Shin and Stulz (1998) find evidence consistent with capital misallocation, Chevalier (1999) and Maksimovic and Phillips (2000) find no support for such misallocation. Billet and Mauer (1999) find that internal capital markets transfer funds to cash constrained divisions with good investment opportunities.

hypotheses in Section IV and the sources and description of the data in Section V. Section VI provides the empirical results and Section VII concludes.

II. The Model

Consider an industry, which we label Industry 1, in which the total number of firms is normalized to 1. Firms in this industry differ in their ability to respond to industry shocks. An innovative firm has the ability to innovate in response to industry shocks caused, for example, by developments in technology, changes in the regulatory environment, or changing macroeconomic conditions. For convenience, we classify firms into two categories: those that are innovative and those that are not. A fraction α_I of the firms in Industry 1 are innovators.

While some firms have the ability to innovate, the outcome of such innovation is uncertain. The innovators may not succeed because, for instance, they are unable to develop necessary technology in time, or because the collective inertia of the firm prevents it from implementing the change quickly enough. Let θ be the probability that a firm's innovation will succeed. For simplicity, it is assumed that the success of the innovators in Industry 1 is perfectly correlated, *i.e.*, either all innovators succeed or all fail.[6] We also assume that innovation is costless. Relaxing this assumption does not affect any of the results.

Firm managers have a preference for increasing assets under their control. It is assumed that managerial actions are unverifiable or costly to verify, so that incentive contracts are insufficient to align managerial interests with those of shareholders. Hence, managers do not unconditionally maximize shareholder value since they derive private benefits from having resources under their control. While all the available capital is invested, conditional on the quantity of these resources, managers maximize shareholder value by choosing the highest-valued projects.[7] All managers are assumed to possess this trait.[8]

---

[6] All we require to obtain our results, however, is that there be some positive correlation in the success of innovation across firms.

[7] Stein (1997) uses a similar approach to explain the benefits of the conglomeration.

The sequence of events is shown in Figure 1. At date 0, firms raise capital from outside investors. At date 1, the outcome of the innovation is realized, and firms make their investment decisions.[9] The first dollar of investment by non-innovative firms produces one unit of the goods or services of Industry 1 with certainty. This is also the output produced by the innovative firms if their innovation attempt fails. In other words, if innovation fails, innovative firms achieve the same output as the non-innovative firms. If innovation is successful, however, the first dollar of investment by innovative firms will produce an output quantity $q_H > 1$. We model diminishing returns to scale by assuming that the second dollar of investment in Industry 1 will produce zero output, irrespective of the type of firm. The cost of producing the good is normalized to zero, irrespective of the technology.[10]

Let P_H be the price of the good in Industry 1 if innovation succeeds, and P_L be the price if it fails. The demand function is given by

$$P_j = a - bQ_j, j \in \{H, L\}, \tag{1}$$

where a and b are positive constants, and Q_j is the industry's aggregate output. Consistent with the firms being able to raise the funds from outside investors at date 0, it is also assumed that the ex ante net present value of the first dollar of investment in Industry 1 (before the resolution of uncertainty about innovation) is positive for all firms. Specifically,

$$\theta P_H + (1-\theta)P_L > 1. \tag{2}$$

[8] In our model, there are no diversification "synergies," so it is the propensity to invest all capital (in the highest valued uses) that creates an incentive for diversification. Diversification synergies can lead to some conglomerates trading at premiums. Here, we abstract from synergies in order to focus on why conglomerates can trade at discounts. Incorporating synergies would not, however, affect our main result that firms also conglomerate to expand their investment opportunities to multiple industries when they are at a competitive disadvantage in one industry.

[9] The assumption that firms raise capital before the outcome of innovation is known results in managers having access to investment capital at the time investment decisions are made, without having to seek external financing at that time. The inability of investors to intervene at the investment stage is realistic, given their lack of information, the free-rider problem, and the potential losses from curbing managerial discretion. It is this access to capital that results in overinvestment due to managers' propensity to invest all available capital.

[10] The qualitative results of the model remain the same if a more general setting is assumed in which innovation can lower marginal production costs, leading to greater output.

In addition to raising capital, firms also have the option of diversifying at date 0.[11] All firms in Industry 1 have the option of diversifying into other industries. For simplicity, we will use a representative industry, Industry 2, into which Industry 1 firms can diversify. For firms in Industry 1, diversification involves merging with a firm in Industry 2.[12] The cost of choosing a diversified (conglomerated) structure is assumed to be negligible.[13] The benefit of diversification in our model is that it establishes an internal capital market, enabling the conglomerate to allocate investment dollars costlessly between the two industries. This provides corporate management the option to allocate resources to industries with relatively better investment opportunities at date 1, when it will be learned whether innovation has succeeded. Single-segment firms, however, are limited to investing only in their own industry.

As with Industry 1, the first dollar of investment in an Industry 2 firm results in positive net present value. For simplicity, we assume Industry 2's payoff is non-stochastic and equal to $V_2 > 1$. A second dollar of investment in an Industry 2 firm produces an expected cash flow $\lambda \in (0,1)$ at date 2, yielding a negative net present value. Hence, additional investment does not add value, as is the case in Industry 1. It is assumed that diversification does not change the investment opportunity set in either industry.[14]

Since stand-alone firms in both industries can invest only the first dollar of capital profitably, they will be able to raise only one dollar each from investors at date 0. This rationing of capital is the result of the managers' penchant for investing all available capital irrespective of the value it adds to shareholders. If conglomeration between firms from Industry 1 and 2

[11] The diversification decision can be viewed as being made by shareholders, given the benefits of diversification in reducing the agency cost arising from the manager's proclivity to invest all available capital.

[12] We assume that the merger is effected through a stock exchange. This assumption simplifies the analysis as we do not have to consider raising additional capital.

[13] We only need an infinitesimal (though non-zero) cost of diversification to obtain our results. The practical effect of assuming infinitesimal costs is that it resolves any indeterminacy, so when firms expect to make exactly the same profits with or without diversification, they will choose not to diversify. To avoid unnecessary notation, we will treat the cost as being zero.

[14] This assumption is not critical. The assumption that all positive net present value projects in Industry 2 have been funded and any further investment in Industry 2 (either by a single-segment firm in that industry or by a conglomerate firm) has negative net present value is sufficient.

takes place, the total resources available to the conglomerate will be two dollars. With these assumptions, we have abstracted away from any synergies from diversification; the sole reason for forming a conglomerate is to gain flexibility in investment allocations across industries. Managers of single-segment firms in Industry 1 can only invest the dollar they raise in Industry 1, irrespective of whether innovation succeeds. Managers of conglomerate firms, however, have the option of switching a dollar intended for a project in Industry 1 to Industry 2, if the value added is greater in Industry 2. Let α_C denote the fraction of firms that choose to diversify in equilibrium.

In summary, the sequence of events is as follows. At date 0, the diversification decision is made. Single segment firms in both industries have a dollar of capital each, while diversified firms have two dollars of investment capital. At date 1, it is publicly observed whether innovation has been successful, and managers of all firms invest. Single-segment firms invest in their own industry, while the conglomerate firms decide whether to shift some resources to Industry 2. At date 3, profits are realized.

There is no private information in the model. Everyone is assumed to be risk-neutral and the risk-free rate is zero.

III. Analysis

First we characterize the nature of the equilibrium prices in Industry 1 by the following two lemmas.

Lemma 1: In equilibrium, $P_L > \lambda$.

Proof:

Suppose $P_L \leq \lambda$. There are two possible cases based on the value of $P_H q_H$. First, suppose $P_H q_H \leq 1$, This implies that $P_H < 1$, since $q_H > 1$. Since $\lambda < 1$, P_L is also less than 1. This violates the assumption in Equation (2) that the net present value of the first dollar of investment in Industry 1 is positive for all firms.

Now suppose $P_H q_H > 1$. Then, if innovation succeeds, innovative conglomerate firms will invest in Industry 1. Since $P_L \leq \lambda$, it must be true that $P_H > 1$ to satisfy the condition in Equation (2) that the net present value of the first dollar of investment in Industry 1 is positive. Therefore, $P_H > P_L$ and $Q_H < Q_L$. The fact that $P_H > 1$ implies that non-innovative conglomerates will also invest in Industry 1 if innovation succeeds. Therefore, $Q_H > Q_L$, which is a contradiction. □

Lemma 1 implies that all conglomerates will invest in Industry 1 if innovation fails. If innovation fails, their cash flow from producing a quantity of one in Industry 1 will be P_L which is greater than λ, the cash flow from investing in Industry 2.

Given our objective, we limit the discussion below to "interior" equilibria as the corner situations are uninteresting in terms of their empirical implications. The interior equilibrium we analyze is one in which some, though not all, non-innovative firms conglomerate in equilibrium.[15] Equilibrium prices in Industry 1 will be affected by whether or not successful innovation occurs, and by λ, the marginal payoff to a second dollar of investment in Industry 2.

Lemma 2: In equilibrium, $P_H = \lambda$.

Proof:

If $P_H < \lambda$, all non-innovative firms will conglomerate in order to be able to switch capital to Industry 2 if innovation succeeds. Since, by assumption, at least some non-innovative firms do not conglomerate in equilibrium, this price cannot be the equilibrium price. If $P_H > \lambda$, all conglomerate firms, will maintain their investment in Industry 1 if innovation succeeds.

[15] The reader might wonder whether the case in which the marginal conglomerate is an innovative firm results in an interior equilibrium. In this case, it must be that some conglomerates switch their capital out of Industry 1 if innovation succeeds, given the result of Lemma 1. Therefore, $P_H q_H = \lambda$. Since $q_H > 1$, $P_H < \lambda$. This implies that non-innovative conglomerates will also switch their capital out of Industry 1 if innovation succeeds. Therefore, all conglomerates will have the same value λ if innovation succeeds. If innovation fails, we already know from Lemma 1 that all conglomerates invest in Industry 1 and will have a value of P_L. Therefore, all conglomerates will have the same value, which is a corner situation with respect to firm value.

Since they also invest in Industry 1 if innovation fails (Lemma 1), there is no motive for conglomeration in the first place and conglomerate firms will not exist.□

From the above two lemmas it follows that innovative firms do not have an incentive to conglomerate. If innovation succeeds, their cash flow is $P_H q_H$, which is greater than λ from Lemma 2. If innovation fails, their cash flow is P_L, which is also greater than λ. Thus, they are always better off investing in Industry 1 and hence, given the small cost of diversification, have no incentive to conglomerate. Therefore, in this equilibrium, three types of firms will exist: innovative and non-innovative single-segment firms, and non-innovative conglomerate firms. If innovation fails, the conglomerates will invest one dollar in Industry 1 and the second dollar in Industry 2 (Lemma 2). If innovation succeeds, conglomerates will invest both dollars in Industry 2. As these conglomerates switch their capital out of Industry 1, the supply of goods in that industry is reduced, driving up the price. This increases the cash flow of the firms continuing to invest in Industry 1. In equilibrium, non-innovative firms conglomerate up to point that there is no further benefit from conglomeration. Thus the payoff from switching to Industry 2 is just equal to that of remaining in Industry 1. The following proposition summarizes the equilibrium outcome.

Proposition 1: In equilibrium, innovative firms do not have the incentive to conglomerate. Non-innovative firms form conglomerates to the point that the cash flow from investing a dollar in Industry 1 if innovation succeeds is equal to the cash flow from switching the dollar to Industry 2. If innovation succeeds, conglomerates invest both dollars in Industry 2. If innovation fails, they invest a dollar each in both industries.

In equilibrium, the values (gross of investment) of various firm types at date 0 will be as follows. The value of an innovative (single-segment) firm, V_I, is given by

$$V_I = \theta P_H q_H + (1-\theta) P_L . \qquad (4)$$

If innovation succeeds, a (non-innovative) conglomerate firm will invest both dollars in Industry 2 (and nothing in Industry 1). If the innovation fails, however, one dollar is invested in each industry. Therefore, V_C, the value of a conglomerate firm, is given by

$$V_C = \theta\lambda + (1-\theta)P_L + V_2, \tag{5}$$

where V_2 is the value of a single-segment firm in Industry 2. The value of the non-innovative single-segment firm, V_N, is given by

$$V_N = \theta P_H + (1-\theta)P_L. \tag{6}$$

Since $P_H = \lambda$ from Lemma 2, $V_C = V_N + V_2$.

If innovation fails, all firms invest in Industry 1 and produce an aggregate quantity of one. Therefore, the equilibrium price in Industry 1 if innovation fails is given by

$$P_L = a - b. \tag{7}$$

If innovation succeeds, the total quantity produced by innovative firms in Industry 1 is $\alpha_I q_H$. The $(1 - \alpha_I - \alpha_C)$ non-innovative single-segment firms produce one unit each. Therefore, the equilibrium price in Industry 1 if innovation succeeds is given by

$$P_H = a - b[\alpha_I q_H + (1 - \alpha_I - \alpha_C)]. \tag{8}$$

Using condition (8) and the fact that $P_H = \lambda$ in equilibrium, the fraction of firms in Industry 1 that choose a conglomerate structure is given by,

$$\alpha_C = 1 - b^{-1}(a - \lambda) + \alpha_I(q_H - 1) \tag{9}$$

Lemma 1 implies that $a > \lambda$, since the demand function in Equation (1) implies that a is the highest possible price. The following proposition follows from Equation (9).

Proposition 2: The extent to which an industry is conglomerated, i.e., industry participants are organized as divisions of conglomerates (α_C), increases with the proportion of innovative firms in that industry (α_I), the impact of successful adaptation on the market for the good (q_H), and the value of diversification (λ).

The intuition behind Proposition 2 is straightforward. If there is an increase in the proportion of innovative firms, the impact of a successful innovation, or the sensitivity of the price to demand, the benefit from diversification increases for non-innovative firms. This is because if the innovation is successful, the profits of non-innovative single-segment firms in Industry 1 will be lower due to the larger aggregate output. Also, it is self-evident that the incentive to diversify increases with the payoff from switching investment to Industry 2.

Our discussion has been framed in terms of Industry 1. This is to simplify the exposition. If Industry 2 was also subject to the type of shocks affecting Industry 1, the rationale for conglomeration would be unaltered, though the number of possible states of the world would increase. Within a conglomerate, there would be the possibility of investment flows in either direction between the two industries, depending on their relative profitability. Our analysis, which has assumed that only the profitability of Industry 1 is stochastic, while Industry 2 is unaffected by shocks, generates the same qualitative results with less notation than would be required in the more complicated setting.

We now turn to the conglomerate excess value. In our model, given that only the non-innovative firms diversify, the median conglomerate can be 'discounted' (have a negative excess value) relative to value imputed from single-segment firms in the two industries.[16] Define Δ as the conglomerate excess value, which can be expressed as the difference between the value of a diversified firm and the sum of the median values of single-segment firms in Industry 1 and Industry 2. The excess value will be non-zero when the median single-segment firm from Industry 1 is an innovative firm, which we take to be the case.[17] Thus, we have

$$\Delta \equiv V_C - V_I - V_2.$$

[16] The discussion is in terms of 'medians', rather than 'means' in order to conform to the usual definition of discounts used in empirical work. There is little qualitative difference for the predictions if we use means instead of medians.

[17] The other possibility is that the median single-segment firm is a non-innovative firm, which would imply an excess value of zero. Therefore, to the extent that there is a positive probability that the median single-segment firm is an innovative firm, all the results hold.

Substituting from equations (4) and (5), we have,

$$\Delta = -\theta\lambda(q_H - 1). \tag{10}$$

The following proposition, based on Equation (10), describes the determinants of the conglomerate excess value.

Proposition 3: The excess value is decreasing in the productivity increase from the innovation (q_H), the value of diversification (λ), and the probability of success of the innovation (θ).

The intuition behind these results is as follows. As q_H or θ increases, the value differential between innovative firms and conglomerates widens, decreasing the excess value. An increase in λ will increase the expected value of the conglomerate. However, the expected value of the innovative firm also increases since the price in Industry 1, P_H, equals λ. Since successful innovation leads to greater output by innovative firms ($q_H > 1$), the increase in their value is greater than that for conglomerates. Thus, an increase in λ causes the excess value to decrease.

IV. Testable implications and hypotheses

The comparative statics that emerge from propositions 2 and 3 link the proportion of conglomerates in an industry and their excess values to the demand function, the value differential between innovative and non-innovative firms, the fraction of innovative firms in the industry, and the ability to extract value from other industries. Since our objective is to study conglomeration across a broad spectrum of industries, it is difficult to characterize many of these links across several industries. Therefore, we frame the empirical hypotheses in terms that relate more directly measurable industry variables such as the proportion of conglomerates in an industry, the investment opportunities of firms in the industry, and excess value.

From Equation (10), we obtain,

$$(q_H - 1) = -\frac{\Delta}{\theta\lambda}.$$

Substituting for $(q_H - 1)$ in Equation (9) and rearranging, we get

$$\alpha_C = 1 - b^{-1}(a - \lambda) - \frac{\alpha_I}{\theta\lambda}\Delta. \tag{11}$$

The equation above indicates that, *ceteris paribus*, the extent to which an industry is conglomerated in equilibrium is expected to be negatively related to Δ, the excess value of conglomerates with divisions in the industry. The second term on the right side of Equation (11) can be interpreted as the profitability of the investment opportunities available to firms in the industry, compared to opportunities in other industries. To see this, note that the industry demand function in Equation (1) implies that industry profits are increasing in a and decreasing in b. Therefore, as opportunities in an industry increase relative to other industries, the conglomeration levels in that industry should decrease. This provides us with the following testable hypothesis:

(H_0) The degree of conglomeration in an industry is inversely related to both the excess value of conglomerates in the industry and to measures of the investment opportunities anticipated for single-segment firms in the industry.

For the empirical analysis it is worth noting that, in Equation (11), the only endogenous variable is α_C, the extent of conglomeration in the industry. This simplifies the empirical analysis since the terms on the right side of the equation can properly be considered as exogenous variables, including the excess value Δ. It can be seen from Equation (10) that the excess value is a function of exogenous variables. As discussed, we use two alternative methods to construct industry excess values from conglomerate excess values, which are defined in the usual way. As a proxy for the profitability of investment opportunities in an industry, we use the median Market/Book ratio of single segment firms in the industry.

The predictions in H_0 provide a useful test of the empirical viability of the model. We believe that the intuition for these predictions is more robust than might appear from the stylized assumptions of the formal model presented. For instance, it could be reasonably argued that the prediction that higher conglomeration and greater discounts should go together holds under far more general conditions. So long as the nature of industry risk is expected to have a disparate impact on the firms in an industry, the ones facing the greatest risk will be the ones that will want to obtain insurance in form of conglomeration. Under many different sets of assumptions, this implies that the greater the relative risk of industry shocks, the greater the extent of conglomeration and the lower the conglomerate excess value.

The predictions relating excess values to levels of conglomeration and other industry characteristics do not follow in any obvious manner from alternative, more negative views of conglomeration. One reason is that the inefficiency of conglomeration is usually discussed in the context of agency problems faced by individual managers and firms, rather than in reference to the environment in which the firm operates.

V. Data Sources and Construction of Variables

a. Data Sources and choice of industries

We use the Compustat Industrial Segment (CIS) database for divisional data and the Compustat annual industrial database for stand-alone data for the years 1978-1997. Both active and research data are used to avoid survivorship bias.[18] To select 50 U.S. industries, we first calculate the total number of divisions and stand-alone firms operating in each 3-digit SIC industry in 1988.[19] This is done as follows. To qualify as a stand-alone firm in 1988, the firm must not have multiple divisions (as reported in the CIS database) during this year, and must have valid assets or valid sales. To qualify as a division in 1988, a candidate's parent firm must have multiple divisions reported in this year. Since divisional assets are sometimes missing,

[18] There is some concern that Compustat covered fewer small firms in the earlier years of our study--this may affect our measure of conglomeration levels since conglomerate firms tend to be large. There is no reason to believe, however, that the cross-sectional variation in conglomeration levels in any given year will be affected. In addition, we note that our results are robust to using the last 10 or even the last 5 years of our sample.

[19] This year is chosen as a mid-way point during the time period we study. Altering this selection year and other robustness issues are discussed in a subsequent section.

valid divisional assets are not required.[20] Thus, all divisions of multi-divisional parent firms in our CIS database for the year 1988 are included for counting purposes. Following the usual practice in the literature, we eliminate financial services and regulated utility industries. We then select the 50 industries with the highest total number of divisions and stand-alone firms that have no more than one missing necessary data item over the twenty years. The missing data requirement eliminates 19 industries, such that our final industry sample consists of 50 out of the largest 79 industries based on the total count of divisions and stand-alone firms in 1988. Replacements for missing data are made on four occasions – these are discussed below.

b. Degree of conglomeration (*Cong*)

This variable is measured as the number of conglomerate divisions in an industry divided by the sum of the number of conglomerate divisions and the number of stand-alone firms in the industry. Divisions and stand-alone firms are counted using the same methodology outlined for industry selection.

c. Industry excess values (*Weighted-EV* and *OLS-EV*)

To begin, we follow Berger and Ofek (1995) in calculating a conglomerate firm's excess value, *CEV*, except that we include any preferred stock in our valuation of a firm. Specifically, we calculate *CEV* as

$$CEV = \ln\left[\frac{CMV}{\sum_{i=1}^{n} DA_i\left[IND_i(V/A)\right]}\right], \qquad (12)$$

where,

CMV = market value of common equity, plus book value of debt of the conglomerate, plus book value of preferred stock.

[20] All of the divisions in our divisional data (for conglomerate firms) have valid 1988 sales, so we are not concerned that allowing divisions with missing assets will result in the inclusion of invalid divisions.

DA_i = asset size for Division i.

$IND_i(V/A)$ = median ratio of total capital (market value of common equity, plus book value of debt, plus book value of preferred stock) to assets for single-segment firms in the 3-digit SIC industry of Division i.

Following Berger and Ofek (1995), industry medians are taken from the narrowest SIC grouping that includes at least five single-segment firms with sufficient data for computing the ratio. We also follow Berger and Ofek's methodology and restrictions for grossing-up divisional assets and their elimination of extreme excess values.[21] We then use the conglomerate excess values to compute two alternative measures of industry excess values.

Weighted-EV is an asset-weighted average excess value measure for each industry, calculated by weighting *CEVs* by each division's relative asset size within the parent conglomerate. To illustrate, consider two conglomerate firms X and Y, each with two divisions labeled D_{X1} and D_{X2} for X, and D_{Y1} and D_{Y2} for Y, where the subscripts 1 and 2 refer to two different industries. Let CEV_X and CEV_Y correspond to a particular year's excess values for conglomerates X and Y, respectively. Suppose the divisional asset sizes are $DA_{X1} = 150$, $DA_{X2} = 50$, $DA_{Y1} = 300$, and $DA_{Y2} = 700$. Note that conglomerate X has a total asset size of 200, while conglomerate Y has a total asset size of 1000. The excess value for Industry 1, $Weighted\text{-}EV_1$, is calculated as follows:

$$Weighted - EV_1 = \frac{CEV_X \times \left(\frac{150}{200}\right) + CEV_Y \times \left(\frac{300}{1000}\right)}{\left(\frac{150}{200}\right) + \left(\frac{300}{1000}\right)}$$

If a division is only a small (large) part of the conglomerate, presumably it has a less (more) important effect on the conglomerate's excess value. The asset weights are used, therefore, to

[21] Berger and Ofek (1995) eliminate conglomerates where the sum of divisional assets deviates from parent firm aggregate assets by more than 25%. They then avoid extreme excess values by eliminating conglomerates where sum of divisional imputed values (the denominator in the *CEV* definition) is less than one-fourth or more than four times *CMV*.

apportion the conglomerate's excess value based on the assets devoted to its multiple divisions. We require that at least five divisions in an industry have valid parent *CEV* measures in order to compute *Weighted-EV*. In three of the 1000 industry-years, this condition is not met, so we ease the restriction on the number of divisions required.

OLS-EV is calculated using an ordinary least squares regression approach, where a separate regression is performed for each year. To estimate the fifty industry *OLS-EVs* for a particular year, only conglomerates with valid divisional assets in one of the 50 industries in that year are retained. Fifty industry variables (*Ind1-Ind50)* are then coded for each division year, where each division's asset weight within the conglomerate is assigned to the corresponding industry variable, and the remaining industry variables are set to zero. The table below provides an illustration using the example listed above.

Obser-vation	Conglo-merate	Dependent variable	Regressors		
			Ind1	Ind2	Ind3...Ind50
1	*X*	CEV_X	(150/200)	(50/200)	0 … 0
2	*Y*	CEV_Y	(300/1000)	(700/1000)	0 … 0

Of course, for any conglomerate firm-year, the sum of the regressors *Ind1* through *Ind50* will be one (as shown above) only when all divisions of the conglomerate operate in one of the 50 industries in the year under consideration. OLS regressions are estimated for each year with no intercept term, and the resulting 50 coefficients are used as each year's 50 industry excess values. The total number of observations in a given year's regression equals the total number of conglomerates with at least one division in the 50 industries. Observation sizes for the 20 regressions (one for each year) range from 616 to 1,112, and adjusted R-squared values range from 0.033 to 0.207 (all but two regressions have adjusted R-squared values exceeding 0.06).

d. Industry median market-to-book (IndMB)

The market-to-book ratio is the market value of a firm (market value of common stock plus book value of long-term debt and current liabilities plus book value of preferred stock) divided by the book value of assets. This ratio is calculated for the universe of stand-alone firms in the Compustat annual database in the 50, three-digit SIC industries and the median is calculated for each industry in each year. We require that an industry have at least five valid ratios, except for one industry year (out of 1,000 total), where this restriction is relaxed so a median can be calculated.

VI. Empirical Results

Table 1 lists attributes for the 50 industries for 1985 and 1995. Even though our selection procedure is biased in favor of the larger industries, Table 1 shows considerable variation in industry counts, assets, excess values and conglomeration levels. For example, in 1995, stand-alone firms dominate the computer and data processing services industry, which has a conglomeration level of only 16.4%. In contrast, the industrial organic chemicals industry is highly conglomerated in 1995, at 83.1%. The computer and office equipment and special industry machinery industries are the most heavily discounted in 1995 (these industries have weighted-excess values of –56.8% and –44.3%, respectively), while the motion picture production & services and the groceries and related products industries have the highest premiums (weighted-excess values are 19.0% and 19.6%).

Figure 2 plots median industry conglomeration levels and excess values during the sample time period. This figure documents the "conglomerate merger wave" during the 1970s being somewhat reversed during the 80s and 90s, as median conglomeration levels in our 50 industries experience a fairly steady decline throughout this period from 73% in 1978 to 44% in 1997. While we do not formally test for any particular pattern to industry excess values over time, they do appear to be slightly cyclical over time. Table 2 provides yearly descriptive statistics for both of these variables, as well as industry market-to-book levels. The median *Weighted-EV* ranges from a low of –20.2% in 1983 to a high of –7.4% in 1991. Clearly, there is variation in our industry excess values over time. We note that our two industry excess value measures are generally on the same order of magnitude as the median values for conglomerates that the existing literature documents. Median market-to-book levels are less than one from 1978 through 1982, perhaps reflecting economic conditions during this time period. They recover to levels greater than one throughout the rest of the sample period (with the lone exception of 1990).

Figure 3 depicts the broad relation between industry excess values and conglomeration over time. Our hypothesis implies that when conglomeration is high, excess values should be low. To examine whether we observe such a pattern, we first calculate each industry's median excess value and conglomeration levels across all 20 years. For each year, we plot the percent of industries *above* their individual median conglomeration level and also the percent of industries *below* their individual median excess value. Our model predicts that these time series should move in the same direction. At first glance this seems to hold in some years but not in others. As discussed previously, however, general conglomeration levels decline through the time period of our study. This effect causes the percent of industries above their long-run median conglomeration levels to be higher in the early years. Figure 4 detrends the conglomeration levels to account for this effect since it may be due in part to reasons we do not model. For each industry, we subtract from the actual conglomeration level the 'expected' change in conglomeration each year, assuming a linear decline from the 1978 level to the 1997 level. We then re-compute an industry median across the 20 years and proceed as we did previously for Figure 3. As can be seen, Figure 4 shows that the proportion of industries with above-median (detrended) conglomeration levels appears to be positively correlated with the proportion of industries with below-median excess value levels, as our model predicts. Neither Figure 3 nor Figure 4, however, link a specific industry's conglomeration level to its specific excess value.

Table 3 directly links individual industry excess values to (raw) conglomeration levels using the industry-specific medians across the 20 years. Panel A shows a 2×2 contingency table where industry years ($N = 50 \times 20 = 1{,}000$) are divided into four categories. The rows correspond to whether an industry's conglomeration level in a particular year is above or below its median across the 20 years. Similarly, the columns correspond to whether an industry's weighted-excess value in a particular year is above or below its median. Our hypothesis predicts that excess values and conglomeration are negatively related, and therefore implies that the population of industry years in the top right cell (high conglomeration, low excess value) and bottom left cell (low conglomeration, high excess value) should be higher than in the other cells. Clearly this is the case, and the chi-square statistic for differences among the cells is highly significant (p-value < .001). Out of 1,000 industry years, 56.2% (562) are consistent with the hypothesis, and a two-tailed binomial test that this percent equals 50% is strongly rejected (p-value < .001). Similar results hold for the contingency table reported in Panel *B*, which uses the OLS excess values. We note, however, that the statistical tests in Table 3 assume independence across observations, an assumption clearly violated by the time-series aspects of the data. Therefore, these results should be taken as only suggestive.

Table 4 reports regressions using conglomeration levels as the dependent variable. These regressions allow us to take into account the multiple factors predicted by the model as well as the time-series nature of the data. For each model number, estimation (a) uses *Weighted-EV* as a regressor, while estimation (b) uses *OLS-EV.* As a base case, Model (1) is a standard OLS regression with an allowance for autocorrelated, AR(1) error terms. The coefficients on the industry's excess values (*Weighted-EV* in estimation (a) and *OLS-EV* in estimation (b)) and the industry's median market-to-book (*IndMB*) are negative as predicted, and both are highly significant (t-values are –4.80 for the former and –11.6 for the latter). An (unreported) examination of the residuals in Model (1) shows that error terms vary across industries. Model (2), therefore, improves the specification by using a weighted least squares approach to allow for heteroskedasticity. A residual analysis leads us to choose industry-specific median conglomeration levels for the weights. The significance levels of the variables of interest in Model (2) are virtually unchanged relative to those in Model (1).

It is likely that each industry has its own natural conglomeration level due to factors we do not consider. Model (3) addresses this possibility using a fixed effects approach to allow for industry-specific constant terms. In this model, which continues to allow for AR(1) disturbances, the variables of interest remain negative and the significance levels slightly improve. The t-values for excess value and *IndMB* are –5.45 and –11.67, respectively, in estimation (a), and –5.61 and –11.73 in estimation (b). Model (4) is the most general model we estimate. While the three previous models estimate a single AR(1) parameter for error terms in all industries, Model (4) estimates a specific AR(1) term for each industry (and also continues to use industry-specific constant terms). We expect significance levels to drop due to the additional parameters this model estimates. The variables of interest do, however, remain negative and highly significant. The t-value in estimation (a) for *Weighted-EV* is –3.62, and in estimation (b) is –2.55 for *OLS-EV*. The t-values for *IndMB* in the two estimations are –5.83 and –4.97, respectively.

It is interesting to note that in all eight regressions, the *IndMB* has more explanatory power than does industry excess value. This is perhaps not surprising – industry market-to-book values provide an overall measure of industry health, and as an industry struggles and experience more adverse shocks, more of its firms choose to conglomerate. The firm-specific factors contributing to excess value that we do not consider might weaken the results for excess value. Finally, industry excess values are inherently noisy measures because the methodology requires a conglomerate's single excess value to be apportioned across its multiple industries.

There are several robustness checks we perform. We are chiefly concerned with biases our data construction methods may impart. When deriving excess values, our methodology follows Berger and Ofek (1995) in removing cases where the sum of divisional assets deviates from aggregate parent assets by more than 25%. In our experience, these are usually cases where the firm has a large percentage of general "corporate" assets that cannot be assigned to a particular division. By excluding these firms, excess values for an industry may be inaccurate (for example, conglomerate firms with particularly large overheads may be particularly discounted due to the wastefulness such overheads potentially imply). Our results are quite robust to removing this data construction requirement. Similarly, our estimates of industry excess values could be affected by our following the literature in eliminating conglomerates that have divisions operating in the financial services or regulated utility industries. Once again, our results are robust to removing this requirement. We are also concerned that choosing the "base year" of 1988 on which to rank industry sizes (the number of conglomerate divisions plus number of stand-alone firms) could bias our results due to some type of survivorship bias. Our results are robust to choosing the largest 50 industries with necessary data on the basis of industry sizes in 1978, the first year of our panel data. Given these robustness checks, we feel that the empirical evidence is supportive of the predictions of the model.

VII. Conclusion

The literature has tended to take a negative view of conglomeration, considering them as particularly susceptible to agency problems. The 'discount' at which conglomerates tend to trade, relative to single-segment firms, is claimed to support this view. In this paper, we have argued that conglomeration may, in fact, be a value-*enhancing* response to agency problems prevalent in *all* firms, not just conglomerates. Hence, conglomerates may, on the whole, represent solutions to costly agency problems in single-segment firms facing industry risk.

We developed a simple industry-based model of conglomeration and discounts. It was shown that conglomeration may optimally induce managers to shift resources away from an industry, in response to unfavorable competitive conditions. This approach is quite different from models that have viewed conglomerates in isolation, rather than in the competitive, risky environment of their industries. The benefit of this approach is that, in addition to providing an alternative, positive view of conglomeration, it allows us to explain broad patterns of conglomeration and discounts across industries and through time.

The model delivers testable predictions. Industry conglomeration levels are expected to be higher when conglomerates are 'discounted' more heavily. Further, industry conglomeration levels are predicted to be higher when investment opportunities (indicated by market-to-book levels) of the industry's single-segment firms are lower. Significant empirical support was found for the model's predictions, using a panel data of fifty of the largest industries over 1978-1997.

References

Amihud, Y. and B. Lev, 1981, "Risk reduction as a managerial motive for conglomerate mergers," *Bell Journal of Economics* 12, 605-617.

Aron, D., 1988, "Ability, moral hazard, firm size, and diversification," *Rand Journal of Economics* 19 (Spring), 72-87.

Berger, P. and E. Ofek, 1995, "Diversification's effect on firm value," *Journal of Financial Economics* 37, 39-65.

Billett, M.T., and D.C. Mauer, 1998, "Cross subsidies, external financing constraints, and the contribution of the internal capital market to firm value," Working paper, University of Iowa, Iowa City, IA.

Bolton, P., and D. Scharfstein, 1990, "A theory of predation based on agency problems in financial contracting," *American Economic Review* 80, 94-106.

Campa, J. and S. Kedia, 1999, "Explaining the diversification discount," Working paper, Harvard Business School, Boston, MA.

Chevalier, J., 1999, "Why do firms undertake diversifying mergers? An analysis of the investment policies of merging firms," Working paper, University of Chicago, Chicago, IL.

Fluck, Z. and A. Lynch, 1999, "Why Do Firms Merge and Then Divest? A Theory of Financial Synergy," *Journal of Business* 72, 319-46.

Graham, J., M. Lemmon, and J. Wolf, 1999, "Does corporate diversification destroy value?" Working paper, University of Utah, Salt Lake City, UT.

Hyland, D., 1999, "Why firms diversify: An empirical examination," Working paper, University of Texas at Arlington, TX.

Jensen, M., 1986, "Agency costs of free cash flow, corporate finance and takeovers," *American Economic Review* 76, 323-329.

Maksimovic, V. and G. Phillips, 2000, "Do conglomerate firms allocate resources inefficiently?," Working paper, University of Maryland, College Park, MD.

Matsusaka, J., 2000, "Corporate diversification, value maximization, and organizational capabilities," *Journal of Business* (forthcoming).

Matsusaka, J. and V. Nanda, 2000, "Internal capital markets and corporate refocusing," *Journal of Financial Intermediation* (forthcoming).

Montgomery, C., 1994, "Corporate diversification," *Journal of Economic Perspectives* 8, 163-178.

Rajan, R., H. Servaes, and L. Zingales, 2000, "The cost of diversity: The diversification discount and inefficient investment," *Journal of Finance,* 55:1, 35-80..

Scharfstein, D., and J. Stein, 2000, "The dark side of internal capital markets: Divisional rent-seeking and inefficient investment", *Journal of Finance* (forthcoming).

Shin, H., and R. Stulz, 1998, "Are internal capital markets efficient", *Quarterly Journal of Economics* 113, 531-552.

Shleifer, A. and R. Vishny, 1989, "Managerial entrenchment: The case of manger-specific investments," *Journal of Financial Economics,* 17, 293-309.

Stein, J., 1997, "Internal capital markets and the competition for corporate resources," *Journal of Finance* 52, 111-133.

Williamson, O., 1975, *Markets and hierarchies: Analysis and antitrust implications* (The Free Press, New York, NY.)

Figure 1. Sequence of events

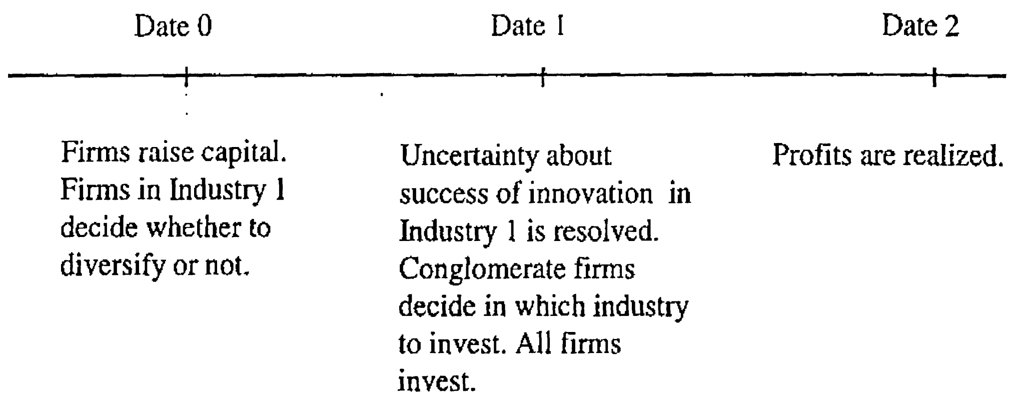

Figure 2
Conglomeration Levels and Excess Values through Time

Figure 2 plots median conglomeration levels and excess values for the 50 industries from 1978 through 1997. Conglomeration level is the number of divisions in an industry divided by the total number of divisions and stand-alone firms in the industry. Weighted-EV is the industry's excess value using the weighted average method. To compute an industry's excess value, a weighted average of the excess values of parent conglomerate firms of divisions operating in the industry is taken, where the conglomerate's excess value is weighted by the division's relative asset size compared to other divisions in the parent. Excess value for a conglomerate is defined as the natural log of the ratio of market value of the parent firm (market value of common equity plus book values of debt and preferred stock) to the parent's imputed value (the sum of imputed values for each division in the parent). OLS-EV uses an ordinary least squares regression approach (one regression for each year) to construct industry excess values. For a given year, all conglomerates operating in at least one of the 50 industries are retained. For each conglomerate year, the dependent variable is the conglomerate's excess value. Fifty industry-specific regressor variables are then coded (if the conglomerate has a division in a relevant industry, the asset-weight of the division is assigned, and 0 is assigned for all remaining industry regressors for which the conglomerate has no division). The OLS coefficients are then used as the industry excess values.

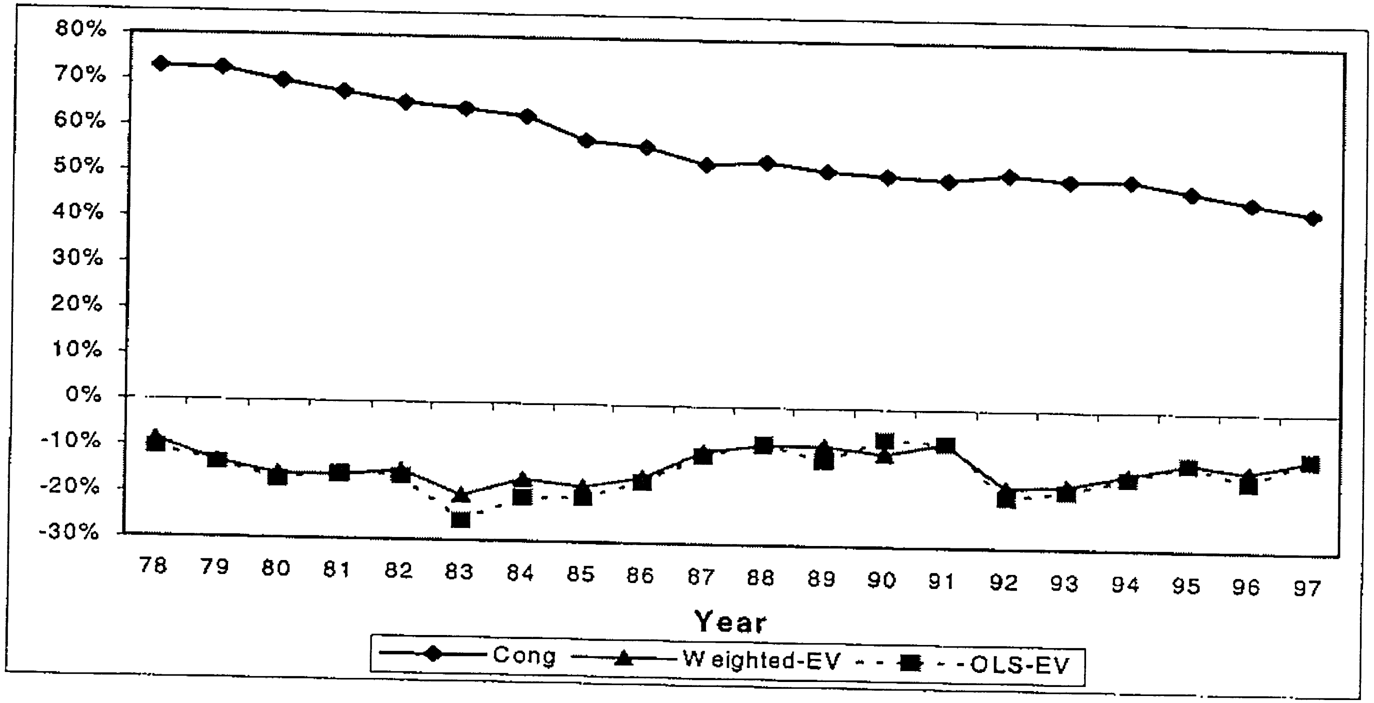

Figure 3
Conglomeration and Excess Value relative to industry medians

For each year, this figure plots the percent of industries *above* their own industry's median conglomeration level (across all 2 years, where conglomeration level is defined as the number of industry divisions divided by the total number of divisions and stand-alone firms), and the percent of industries with excess values *below* their own industry's median excess value (also across all 20 years). *Weighted-EV* is the industry's excess value using the weighted average method. To compute an industry's excess value, a weighted average of the excess values of parent conglomerate firms of divisions operating in the industry is taken, where the conglomerate's excess value is weighted by the division's relative asset size compared to other divisions in the parent. Excess value for a conglomerate is defined as the natural log of the ratio of market value of the parent firm (market value of common equity plus book values of debt and preferred stock) to the parent's imputed value (the sum of imputed values for each division in the parent). OLS-EV uses an ordinary least squares regression approach (one regression for each year) to construct industry excess values. For a given year, all conglomerates operating in at least one of the 50 industries are retained. For each conglomerate year, the dependent variable is the conglomerate's excess value. Fifty industry-specific regressor variables are then coded (if the conglomerate has a division in a relevant industry, the asset-weight of the division is assigned, and 0 is assigned for all remaining industry regressors for which the conglomerate has no division). The OLS coefficients are then used as the industry excess values.

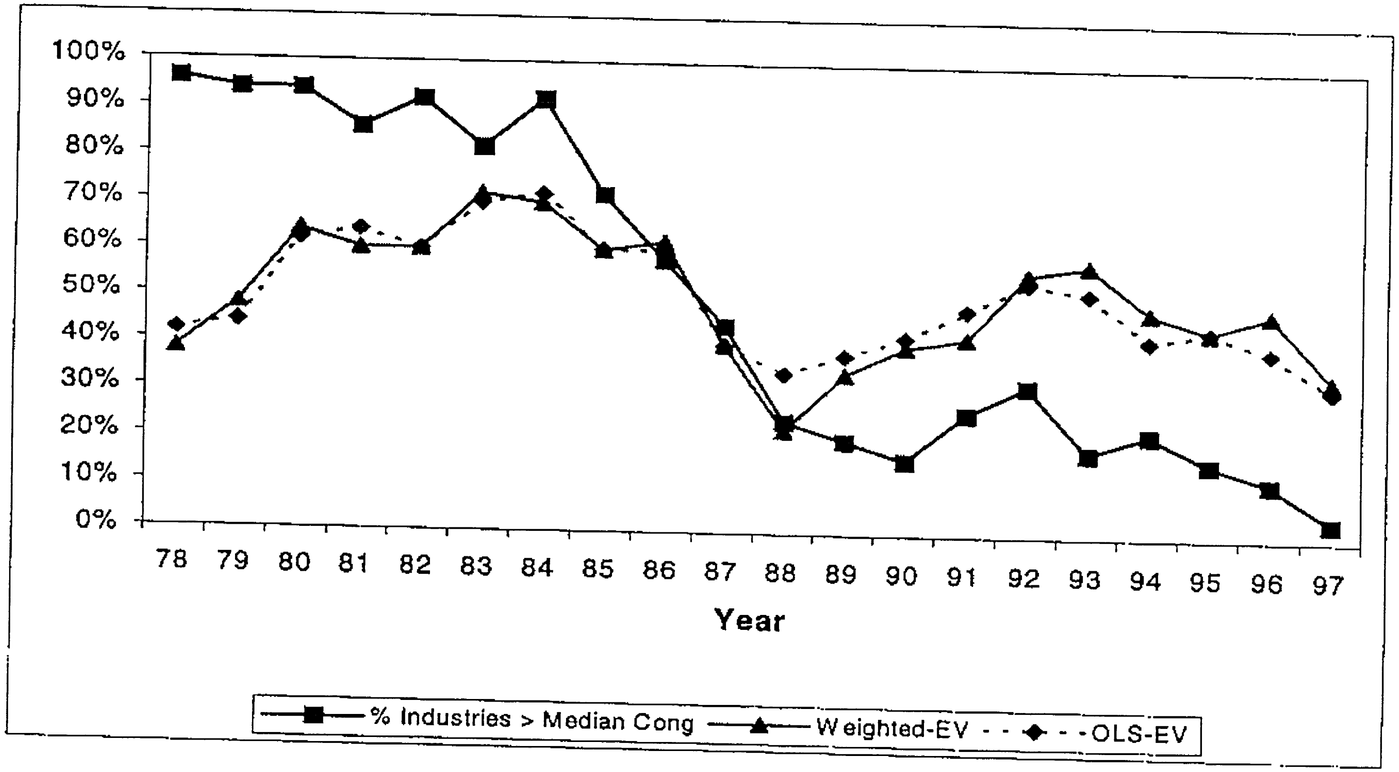

Figure 4
Detrended Conglomeration and Excess Value relative to industry medians

For each year, these figures percent of industries *above* their own industry's median conglomeration level (across all 20 years, where conglomeration level is defined as the number of industry divisions divided by the total number of divisions and stand-alone firms), and the percent of industries with excess values *below* their own industry's median excess value (also across all 20 years). Conglomeration levels have been de-trended to adjust for each industry's overall change in conglomeration over the time period. *Weighted-EV* is the industry's excess value using the weighted average method. To compute an industry's excess value, a weighted average of the excess values of parent conglomerate firms of divisions operating in the industry is taken, where the conglomerate's excess value is weighted by the division's relative asset size compared to other divisions in the parent. Excess value for a conglomerate is defined as the natural log of the ratio of market value of the parent firm (market value of common equity plus book values of debt and preferred stock) to the parent's imputed value (the sum of imputed values for each division in the parent). OLS-EV uses an ordinary least squares regression approach (one regression for each year) to construct industry excess values. For a given year, all conglomerates operating in at least one of the 50 industries are retained. For each conglomerate year, the dependent variable is the conglomerate's excess value. Fifty industry-specific regressor variables are then coded (if the conglomerate has a division in a relevant industry, the asset-weight of the division is assigned, and 0 is assigned for all remaining industry regressors for which the conglomerate has no division). The OLS coefficients are then used as the industry excess values.

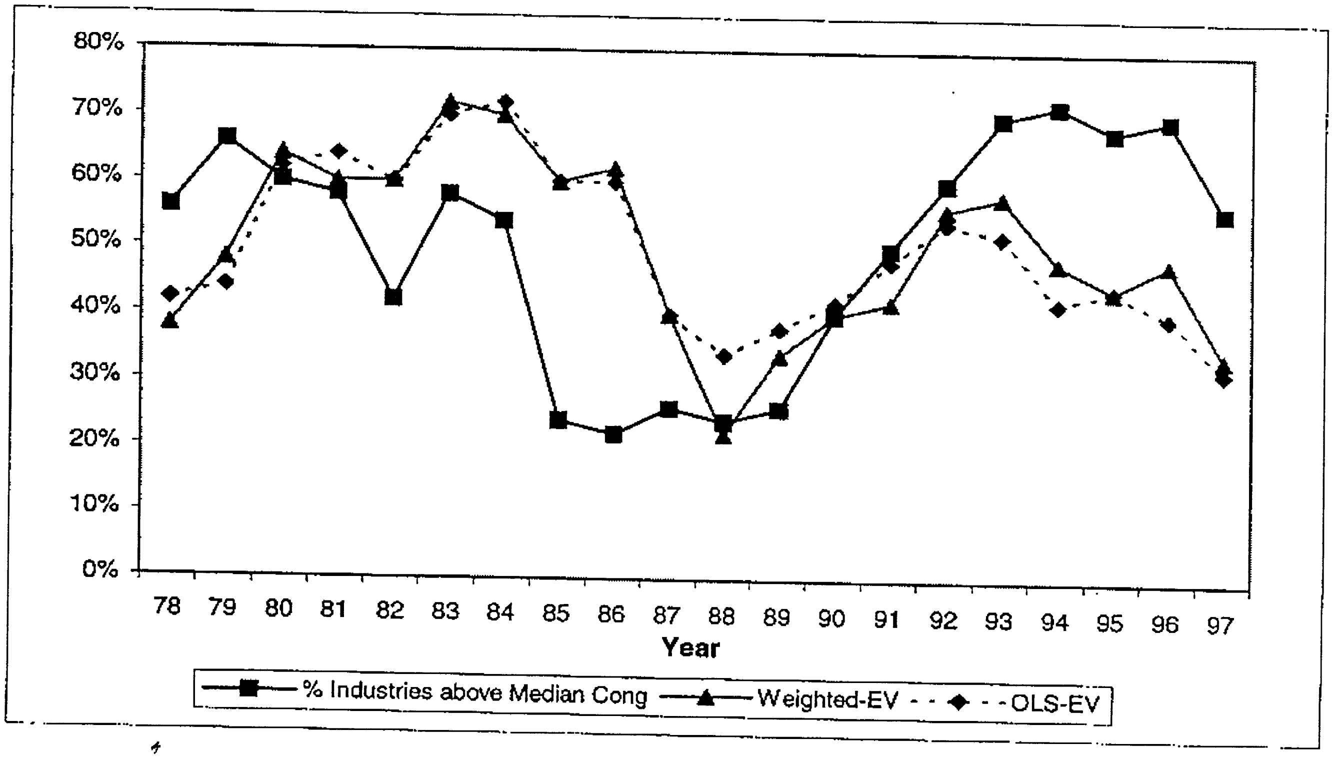

Table 1
Attributes of 50 industries in 1985 and 1995

Weighted-EV is the industry's excess value using the weighted average method. To compute an industry's excess value, a weighted average of the excess values of parent conglomerate firms of divisions operating in the industry is taken, where the conglomerate's excess value is weighted by the division's relative asset size compared to other divisions in the parent. Excess value for a conglomerate is defined as the natural log of the ratio of market value of the parent firm (market value of common equity plus book values of debt and preferred stock) to the parent's imputed value (the sum of imputed values for each division in the parent). OLS-EV uses an ordinary least squares regression approach (one regression for each year) to construct industry excess values. For a given year, all conglomerates operating in at least one of the 50 industries are retained. For each conglomerate year, the dependent variable is the conglomerate's excess value. Fifty industry-specific regressor variables are then coded (if the conglomerate has a division in a relevant industry, the asset-weight of the division is assigned, and 0 is assigned for all remaining industry regressors for which the conglomerate has no division). The OLS coefficients are then used as the industry excess values. Conglomeration for an industry is defined as the number of divisions of conglomerate firms operating in that 3-digit SIC code, divided by the number of divisions plus the number of single-segment firms operating in that industry.

	1985									1995										
	Conglomerate Divs.			Stand-alone Firms			Industry Excess Value & Cong.			Conglomerate Divs.			Stand-alone Firms			Industry Excess Value & Cong.				
Name of industry	N	Med. asset	Total assets	N	Med. asset	Total assets	Wgtd EV	OLS EV	Cong	N	Med. asset	Total assets	N	Med. asset	Total assets	Wgtd EV	OLS EV	Con. Lev.		
		($ mil)	($ mil)		($ mil)	($ mil)	(%)	(%)	(%)		($ mil)	($ mil)		($ mil)	($ mil)	(%)	(%)	(%)		
Aircraft and Parts	65	226	46,684	9	30	5,238	-19.5	-25.4	87.8	39	919	79,857	17	81	13,642	17.3	39.7	69.6		
Beverages	27	513	25,616	16	70	7,129	8.6	15.6	62.8	36	1,035	71,229	44	75	23,206	12.5	21.8	45.0		
Blast Furnace & Basic Steel Products	63	102	29,707	21	173	11,177	-24.2	-32.4	75.0	52	156	37,250	49	512	71,306	2.4	7.0	51.5		
Commercial Printing	19	35	973	25	24	4,254	-30.1	-39.5	43.2	15	31	4,698	25	126	13,880	-10.6	-11.5	37.5		
Communications Equipment	80	21	25,395	131	14	25,126	-9.6	-7.1	37.9	87	52	126,228	202	32	92,393	-39.4	-42.6	30.1		
Computer and Data Processing Svcs.	77	12	3,889	267	10	74,307	-23.2	-25.9	22.4	133	10	18,940	680	18	178,093	-30.9	-29.3	16.4		
Computer and Office Equipment	76	26	12,377	190	18	40,404	-17.8	-20.5	28.6	67	19	48,292	266	32	169,299	-56.8	-80.3	20.1		
Construction and Related Machinery	91	84	23,695	21	24	5,865	-12.6	-14.0	81.3	72	123	30,053	20	54	1,711	-29.5	-45.1	78.3		
Crude Petroleum And Natural Gas	261	68	246,266	268	7	30,170	-10.4	-9.2	49.3	201	78	365,755	200	47	63,110	-4.6	-4.1	50.1		
Drugs	89	86	44,908	122	7	4,922	-28.8	-32.5	42.2	82	153	138,503	386	18	109,904	-41.3	-49.4	17.5		
Eating and Drinking Places	59	51	12,704	104	25	14,769	-7.1	-6.7	36.2	46	37	18,393	148	37	43,939	-32.8	-53.6	23.7		
Electric Lighting and Wiring Equip.	41	42	11,626	14	22	633	-9.4	-8.2	74.5	35	64	31,196	22	18	2,019	-25.5	-35.9	61.4		
Electrical Goods	43	14	3,409	28	11	1,085	-4.5	0.6	60.6	38	30	6,809	39	37	9,334	-16.2	-13.0	49.4		
Electrical Industrial Apparatus	30	45	8,358	16	17	8,275	-1.0	8.5	65.2	39	68	19,516	20	19	2,561	-25.2	-34.2	66.1		
Electronic Components & Accessories	117	13	17,775	115	20	11,418	-19.2	-20.5	50.4	93	16	50,497	207	55	68,781	-32.4	-33.2	31.0		
Fabricated Structural Metal Products	67	28	4,257	27	13	911	-13.2	-14.4	71.3	34	74	4,250	24	66	1,824	-22.8	-22.8	58.6		
General Industrial Machinery	109	37	13,188	42	22	2,236	-13.7	-13.8	72.2	76	51	20,768	51	27	4,023	-12.2	-11.2	59.8		
Gold and Silver Ores	27	10	2,514	73	6	1,958	-1.6	3.9	27.0	27	31	3,410	100	57	30,564	8.6	11.0	21.3		
Groceries and Related Products	31	47	6,161	28	26	3,719	-21.2	-29.2	52.5	20	99	15,023	33	30	7,220	19.6	34.5	37.7		
Grocery Stores	24	110	10,677	45	172	25,896	-24.4	-31.8	34.8	13	489	17,112	55	387	64,927	-4.0	-31.8	19.1		

(Continued)

Table 1 (continued)
Attributes of 50 industries in 1985 and 1995

Name of Industry	1985 Conglomerate Divs. N	Med. asset ($ mil)	Total assets ($ mil)	1985 Stand-alone Firms N	Med. asset ($ mil)	Total assets ($ mil)	1985 Industry Excess Value & Cong. Wgtd EV (%)	OLS EV (%)	Cong (%)	1995 Conglomerate Divs. N	Med. asset ($ mil)	Total assets ($ mil)	1995 Stand-alone Firms N	Med. asset ($ mil)	Total assets ($ mil)	1995 Industry Excess Value & Cong. Wgtd EV (%)	OLS EV (%)	Con. Lev. (%)
Hotels and Motels	37	90	9,733	21	10	3,993	1.5	7.7	63.8	34	88	19,450	44	69	9,143	10.2	12.8	43.6
Industrial Organic Chemicals	37	587	37,759	9	292	7,383	-29.0	-49.0	80.4	54	637	80,449	11	984	12,200	-5.9	-1.9	83.1
Machinery, Equipment, and Supplies	40	22	2,006	23	23	946	-2.4	1.3	63.5	32	13	3,135	27	48	3,092	5.2	9.7	54.2
Measuring and Controlling Devices	124	21	13,327	134	13	7,988	-24.9	-32.0	48.1	71	23	19,277	167	24	14,827	-39.4	-50.0	29.8
Medical Instruments and Supplies	69	14	15,179	143	4	12,098	-21.5	-29.1	32.5	84	26	30,397	268	13	33,911	-6.5	0.5	23.9
Metalworking Machinery	39	37	3,605	16	74	4,039	-10.1	-8.5	70.9	32	54	9,719	16	204	7,618	-25.7	-23.4	66.7
Misc. Amusement, Recreation Svcs.	30	31	6,571	36	68	6,592	-20.5	-20.2	45.5	43	46	19,141	79	152	26,860	10.6	22.7	35.2
Misc. Electrical Equip. & Supplies	28	25	5,859	23	9	619	-29.3	-37.2	54.9	30	20	7,499	33	25	7,825	-1.0	6.6	47.6
Misc. Fabricated Metal Products	50	40	4,066	21	24	3,641	-18.9	-23.1	70.4	32	94	8,668	13	44	2,511	-10.3	-8.1	71.1
Miscellaneous Chemical Products	35	97	8,128	17	61	8,037	-47.5	-62.0	67.3	30	206	20,020	21	146	16,080	5.3	11.4	58.8
Miscellaneous Durable Goods	18	14	531	17	9	446	-36.8	-54.5	51.4	21	18	1,728	17	55	1,764	-2.7	-2.6	55.3
Miscellaneous Manufactures	30	37	3,780	13	3	166	-36.8	-64.6	69.8	16	34	3,958	17	38	1,196	-30.6	-29.6	48.5
Motion Picture Production & Services	28	28	8,791	44	7	10,971	-12.2	-17.8	38.9	35	70	45,188	41	12	5,328	19.0	33.4	46.1
Motor Vehicles and Equipment	92	86	28,842	48	157	235,119	-10.1	-10.7	65.7	92	276	335,164	79	92	362,213	-11.9	-10.1	53.8
Nonferrous Rolling and Drawing	33	59	3,352	17	64	14,477	-18.1	-22.4	66.0	32	198	12,925	24	152	14,653	-5.3	-4.3	57.1
Nonstore Retailers	18	22	2,636	26	9	1,248	-34.5	-51.6	40.9	24	57	6,726	48	42	7,569	-31.7	-47.4	33.3
Oil and Gas Field Services	96	36	29,157	27	20	1,964	-10.5	-9.4	78.0	67	51	24,380	42	74	8,656	7.7	14.2	61.5
Paper Mills	44	648	39,160	10	221	6,349	-3.6	-3.8	81.5	47	982	88,746	12	554	12,225	-24.5	-27.8	79.7
Petroleum Refining	58	1,441	348,724	13	278	66,873	-23.3	-29.0	81.7	59	2,009	431,295	14	528	68,053	-15.3	-18.0	80.8
Photographic Equipment and Supplies	17	15	12,694	27	7	24,345	19.7	32.0	38.6	17	122	30,278	28	24	7,899	6.8	8.8	37.8
Professional & Commercial Equipment	28	5	1,124	39	9	2,872	-56.1	-90.7	41.8	42	16	9,028	79	51	20,389	-20.9	-22.1	34.7
Radio and Television Broadcasting	48	137	16,285	14	24	10,260	-3.6	-4.8	77.4	62	153	54,861	45	209	19,087	9.7	12.0	57.9
Refrigeration and Service Machinery	49	36	8,270	20	21	11,659	-32.1	-37.6	71.0	48	77	14,884	27	32	5,129	-5.3	0.7	64.0
Search and Navigation Equipment	57	87	42,877	22	27	975	-8.4	-3.1	72.2	44	129	33,749	12	48	13,449	-32.4	-42.2	78.6
Soap, Cleaners, and Toilet Goods	61	75	18,938	34	9	1,815	-46.6	-54.8	64.2	43	159	44,232	44	55	14,636	-20.9	-24.8	49.4
Special Industry Machinery	56	49	8,839	46	15	3,189	-26.6	-37.2	54.9	54	62	9,255	72	45	10,110	-44.3	-62.3	42.9
Telephone Communication	37	97	54,144	108	459	463,540	-10.2	-10.6	25.5	94	205	166,079	167	463	859,355	-7.0	-3.9	36.0
Toys and Sporting Goods	28	40	2,953	23	38	3,037	-10.2	-10.5	54.9	24	50	3,660	55	26	8,580	-40.7	-46.5	30.4
Trucking & Courier Services, Ex. Air	34	78	4,132	41	54	8,697	-27.4	-40.0	45.3	46	72	13,562	50	93	70,709	-21.2	-38.5	47.9
Variety Stores	19	402	18,407	22	90	5,803	3.3	11.0	46.3	15	1,556	60,577	27	407	16,616	-1.6	-0.9	35.7

Table 2
Descriptive statistics for key variables

Statistics are shown for 50 three-digit SIC industries in each year and overall across all years. *Cong* (conglomeration level) is the number of divisions in an industry divided by the total number of divisions and stand-alone firms in the industry. *Weighted-EV* is the industry's excess value using an asset-weighted weighted average method that weights conglomerate excess values by the division's asset weight within the parent firm. OLS-EV uses an ordinary least squares regression approach (one regression for each year) to construct industry excess values. For a given year, all conglomerates operating in at least one of the 50 industries are retained. For each conglomerate year, the dependent variable is the conglomerate's excess value. Fifty industry-specific regressor variables are then coded (if the conglomerate has a division in a relevant industry, the asset-weight of the division is assigned, and 0 is assigned for all remaining industry regressors for which the conglomerate has no division). The OLS coefficients are then used as the industry excess values. *IndMB* is the median market-to-book ratio for stand-alone firms in the division's industry.

Year	Cong (Conglomeration level)			Weighted-EV (Weighted-Excess value)			OLS-EV (OLS-EV)			IndMB (Industry Market-to-Book)		
	Mean (%)	Med (%)	Std Dev (%)	Mean (%)	Med (%)	Std Dev (%)	Mean (%)	Med (%)	Std Dev (%)	Mean	Med	Std Dev
78	69.9	72.8	15.4	-11.0	-8.8	15.7	-17.1	-10.3	32.3	0.94	0.87	0.35
79	68.9	72.6	16.0	-14.8	-13.3	16.3	-21.6	-13.5	38.8	1.06	0.88	0.66
80	67.6	69.9	15.3	-19.1	-15.8	20.0	-25.5	-17.1	36.1	1.24	0.97	0.78
81	65.8	67.7	16.1	-19.2	-16.0	19.1	-22.6	-15.7	31.1	1.09	0.98	0.45
82	64.0	65.5	14.9	-15.6	-14.9	19.3	-17.5	-16.0	30.2	1.15	0.98	0.57
83	62.2	64.2	16.0	-20.9	-20.2	17.0	-25.7	-25.6	26.4	1.35	1.16	0.52
84	60.6	62.8	16.6	-18.2	-16.4	16.3	-22.9	-20.4	26.0	1.16	1.04	0.39
85	56.8	57.7	17.3	-17.4	-18.0	14.5	-21.3	-20.4	22.8	1.24	1.18	0.40
86	54.8	56.5	17.8	-17.9	-15.8	15.4	-20.9	-16.7	24.0	1.25	1.14	0.44
87	53.6	52.9	17.6	-11.1	-9.9	17.5	-13.6	-10.7	30.8	1.12	1.05	0.32
88	52.7	53.5	16.8	-8.3	-8.3	10.9	-8.7	-7.8	17.3	1.10	1.04	0.29
89	52.0	51.8	16.8	-9.7	-8.3	13.3	-11.9	-11.5	22.4	1.13	1.05	0.32
90	51.2	50.9	17.3	-10.5	-9.9	13.4	-11.8	-6.7	21.8	0.98	0.90	0.31
91	51.6	50.1	17.5	-10.2	-7.4	16.5	-11.8	-7.4	28.5	1.13	1.04	0.47
92	51.7	51.5	17.8	-16.3	-17.0	18.7	-18.7	-19.1	29.6	1.26	1.12	0.44
93	50.9	50.4	17.6	-15.5	-16.3	15.7	-17.0	-17.5	24.2	1.46	1.46	0.47
94	50.0	50.4	17.8	-12.5	-13.9	14.1	-13.9	-14.5	20.0	1.31	1.28	0.35
95	47.8	48.2	18.1	-13.1	-11.2	18.9	-14.3	-11.4	26.9	1.40	1.27	0.53
96	46.6	46.0	18.3	-11.2	-12.8	17.4	-10.8	-15.1	23.1	1.39	1.26	0.46
97	44.4	43.9	18.2	-8.7	-10.0	19.3	-8.8	-9.9	26.0	1.45	1.36	0.43
All years	56.1	57.7	18.5	-14.1	-12.9	16.9	-16.8	-13.8	27.7	1.21	1.10	0.48

Table 3
Conglomeration vs. excess value contingency table

Panel *A* is a 2 × 2 contingency table showing the number of industry-years above and below median Weighted-Excess value vs. the number of industry-years above and below median conglomeration, where industry-specific medians are computed for each industry across all 20 years (1978 through 1997). Panel B is a similar contingency table using OLS-Excess values. Conglomeration level is the number of divisions in an industry divided by the total number of divisions and stand-alone firms in the industry. *Weighted-EV* is the industry's excess value using an asset-weighted weighted average method that weights conglomerate excess values by the division's asset weight within the parent firm. OLS-EV uses an ordinary least squares regression approach (one regression for each year) to construct industry excess values. For a given year, all conglomerates operating in at least one of the 50 industries are retained. For each conglomerate year, the dependent variable is the conglomerate's excess value. Fifty industry-specific regressor variables are then coded (if the conglomerate has a division in a relevant industry, the asset-weight of the division is assigned, and 0 is assigned for all remaining industry regressors for which the conglomerate has no division). The OLS coefficients are then used as the industry excess values.

Panel *A*

Median conglomeration vs. median weighted-excess value ($N = 1000$)

	Weighted-EV ≥ median	Weighted-EV < median
Conglomeration % ≥ median	219 (21.9%)	281 (28.1%)
Conglomeration % < median	281 (28.1%)	219 (21.9%)

Chi-square = 15.376 (p-value < .001)

Panel *B*

Median conglomeration vs. median OLS-excess value ($N = 1000$)

	OLS-EV ≥ median	OLS-EV < median
Conglomeration % ≥ median	224 (22.4%)	276 (27.6%)
Conglomeration % < median	276 (27.6%)	224 (22.4%)

Chi-square = 10.816 (p-value = .001)

Table 4
Panel data regression results

Reported below are regression results. *Cong* (conglomeration level) is the number of divisions in an industry divided by the total number of divisions and stand-alone firms in the industry. *Weighted-EV* is the industry's excess value using an asset-weighted weighted average method that weights conglomerate excess values by the division's asset weight within the parent firm. OLS-EV uses an ordinary least squares regression approach (one regression for each year) to construct industry excess values. For a given year, all conglomerates operating in at least one of the 50 industries are retained. For each conglomerate year, the dependent variable is the conglomerate's excess value. Fifty industry-specific regressor variables are then coded (if the conglomerate has a division in a relevant industry, the asset-weight of the division is assigned, and 0 is assigned for all remaining industry regressors for which the conglomerate has no division). The OLS coefficients are then used as the industry excess values. *IndMB* is the median market-to-book ratio for stand-alone firms in the industry. Coefficients are reported above the *t*-values which appear in parentheses.

Dependent variable: Cong   1000 observations (50 industries, 20 years)

Model	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
Description	OLS with AR(1) errors	OLS with AR(1) errors	Weighted-LS for Het. & AR(1) errors	Weighted-LS for Het. & AR(1) errors	Fixed effects (indust. constants) w/ AR(1) errors	Fixed effects (indust. constants) w/ AR(1) errors	Fixed effects (indust. constants) with industry-specific AR(1)	Fixed effects (indust constants) with industry-specific AR(1)
Constant	0.664 (26.825)	0.665 (26.837)	0.663 (25.228)	0.665 (25.169)				
Weighted-EV	-0.083 (-4.802)		-0.083 (-4.809)		-0.084 (-5.453)		-0.034 (-3.622)	
OLS-EV		-0.052 (-4.791)		-0.052 (-4.801)		-0.054 (-5.613)		-0.014 (-2.548)
IndMB	-0.096 (-11.578)	-0.095 (-11.567)	-0.096 (-11.576)	-0.095 (-11.567)	-0.089 (-11.668)	-0.089 (-11.728)	-0.027 (-5.830)	-0.022 (-4.971)
R-squared*	0.138	0.136	0.120	0.116	0.100	0.098	0.034	0.024

*Adjusted R^2 based on non-autocorrelated disturbances.