THE JOURNAL OF FINANCE • VOL. LVII, NO. 4 • AUGUST 2002

Explaining the Diversification Discount

JOSE MANUEL CAMPA and SIMI KEDIA*

ABSTRACT

This paper argues that the documented discount on diversified firms is not per se evidence that diversification destroys value. Firms choose to diversify. We use three alternative econometric techniques to control for the endogeneity of the diversification decision, and find evidence supporting the self-selection of diversifying firms. We find a strong negative correlation between a firm's choice to diversify and firm value. The diversification discount always drops, and sometimes turns into a premium. There also exists evidence of self-selection by refocusing firms. These results point to the importance of explicitly modeling the endogeneity of the diversification status in analyzing its effect on firm value.

Firms choose to diversify. They choose to diversify when the benefits of diversification outweigh the costs of diversification and stay focused when they do not. The characteristics of firms that diversify, which make the benefits of diversification greater than the costs of diversification, may also cause firms to be discounted. A proper evaluation of the effect of diversification on firm value should take into account the firm-specific characteristics that bear both on firm value and on the decision to diversify.

Research by Lang and Stulz (1994), Berger and Ofek (1995), and Servaes (1996) shows unambiguously that diversified firms trade at a discount relative to nondiversified firms in their industries. Other research confirms the existence of this discount on diversified firms, and this result seems to

*Campa is with IESE Business School, Madrid, Spain. Kedia is with Harvard University. We thank Philip Berger; Ben Esty; Stuart Gilson; Bill Greene; Charles Himmelberg; Kose John; Vojislav Maksimovic; Scott Mayfield; Maureen O'Hara; Richard Ruback; Henri Servaes; Jeremy Stein; Emilio Venezian; Michael Weisbach; and seminar participants at the 1999 Western Finance Association Meetings, 1999 NBER Summer Conference in Corporate Finance, 2001 European Finance Association Meetings, 2001 European Financial Management Association Meetings, 2002 American Finance Association Meetings, Harvard Business School, Cornell University, Georgetown University, Rutgers University, Darden School, University of Navarra, and Michigan State University for helpful comments. We thank Chris Allen and Sarah Eriksen for help with the data. Financial support from the Division of Research at Harvard Business School and the Center for Investments and International Finance Research (CIIF) at IESE Business School are gratefully acknowledged. All errors remain our responsibility.

be robust to different time periods and different countries.[1] There is a growing consensus that the discount on diversified firms implies a destruction of value on account of diversification, that is, on account of firms operating in multiple divisions.

This study shows that the failure to control for firm characteristics that lead firms to diversify and be discounted may wrongly attribute the discount to diversification instead of the underlying characteristics. For example, consider a firm facing technological change, which adversely affects its competitive advantage in its industry. This poorly performing firm will trade at a discount relative to other firms in the industry. Such a firm will also have lower opportunity costs of assigning its scarce resources in other industries, and this might lead it to diversify. If poorly performing firms tend to diversify, then not taking into account past performance and its effect on the decision to diversify will result in attributing the discount to diversification activity, rather than to the poor performance of the firm.

Also consider the case of a firm that possesses some unique organizational capability that it wants to exploit. Incomplete information may force this firm to enter into a costly search through diversification to find industries with a match to its organizational capital. Matsusaka (2001) proposes a model in which a value-maximizing firm forgoes the benefits of specialization to search for a better match. During the search period, the market value of the firm will be lower than the value of a comparable single-segment firm. Maksimovic and Phillips (2002) also develop a model where the firm optimally chooses the number of segments in which it operates depending on its comparative advantage. Not taking into account firm characteristics, which make diversification optimal, in this case searching for a match, may again attribute the discount wrongly to value destruction arising from diversification.

This does not imply that there are no agency costs associated with firms operating in multiple divisions. Consider the impact of cross-sectional variation in private benefits of managers. A firm with a manager who has high private benefits will undertake activities that are at conflict with shareholder value maximization. Such a firm will be discounted relative to other firms in its industry. Such a manager is also more likely to undertake value-destroying diversification. However, even in this case, the observed discount on multisegment years is partially accounted for by the ex ante discount at which the firm is trading, on account of high private benefits, before diversification. Not taking into account firm characteristics, in this case high agency costs, leads to an overestimation of the value destruction attributed to diversification.

[1] Servaes (1996) finds a discount for conglomerates during the 1960s while Matsusaka (1993) documents gains to diversifying acquisitions in the late 1960s in the United States. Lins and Servaes (1999) document a significant discount in Japan and the United Kingdom, though none exists for Germany. The evidence from emerging economies is mixed. While Khanna and Palepu (2000), and Fauver, Houston, and Naranjo (1998) find little evidence of a diversification discount in emerging markets, Lins and Servaes (1998) report a diversification discount in a sample of firms from seven emerging markets.

In this paper, we attempt to control for this endogeneity of a firm's decision to diversify in evaluating the effect of diversification on firm value. The arguments suggest that the decision to diversify depends on the presence of some firm-specific characteristics that lead some firms to generate more value from diversification than others. Choice of organization structure should, therefore, be treated as an endogenous outcome that maximizes firm value, given a set of exogenous determinants of diversification, that is, the set of firm characteristics. Evaluating the impact of diversification on firm value, therefore, requires taking into account the endogeneity of the diversification decision.

Controlling for the endogeneity of the diversification decision requires identifying variables that affect the decision to diversify while being uncorrelated with firm value. This becomes difficult, as most variables that bear on the diversification decision also impact firm value. We build on the methodology of Berger and Ofek (1995) and the insights of Lang and Stulz (1994) to control for the endogeneity of the diversification decision. As do Berger and Ofek, we value firms relative to the median single-segment firm in the industry. This measure has the advantage of being neutral to industry and time shocks that affect all firms in a similar way. However, Lang and Stulz show that industry characteristics are important in a firm's decision to diversify.[2] We explore the data for systematic industry differences among single-segment and diversifying firms that might help explain the decision to diversify.

We first reproduce the results existing in the literature and identify a diversification discount in our sample. Preliminary data analysis shows that conglomerates differ from single-segment firms in their underlying characteristics. We control for the endogeneity of the diversification decision in three ways. First, we control for unobservable firm characteristics that affect the diversification decision by introducing fixed-firm effects. Second, we model the firm's decision to diversify as a function of industry, firm, and macroeconomic characteristics. We use the probability of diversifying as an instrument for the diversification status in evaluating the effect of multiple segment operations on firm value. Last, we model an endogenous self-selection model and use Heckman's correction to control for the self-selection bias induced on account of firms' choosing to diversify.

The diversification discount always drops, and sometimes turns into a premium, when we control for the endogeneity of the diversification decision. The evidence in all three methods indicates that the discount on multiple-segment firm years is partly due to endogeneity. The coefficient of the correction for self-selection is negative, indicating that there is a negative correlation between a firm's choice to diversify and firm value. This supports the view that firm characteristics, which cause firms to diversify, also cause them to be discounted.

[2] Lang and Stulz (1994) find that firms that diversify tend to be in slow-growing industries. They also report that diversified firms have lower Tobin's q than focused firms, but this difference was driven by differences among firms across industries rather than within an industry.

Finally, we do a similar analysis in a sample of refocusing firms. Comment and Jarrell (1995), John and Ofek (1995), and Berger and Ofek (1996) document an increase in firm value associated with the decision to refocus. Much like the decision to diversify, the decision to refocus is also endogenous: Firms choose to refocus when the presence of firm-specific characteristics makes the benefits of refocusing greater than the costs of refocusing.[3] Consider the case when changes in industry conditions generate higher than expected growth opportunities in one segment. This might increase the cost of inefficient internal capital markets, increasing the cost of operating in multiple divisions and making refocusing optimal. In this case, firm characteristics that make the refocusing decision optimal, that is, growth opportunities, also cause the firms to be more highly valued. Unlike the diversification decision, the refocusing decision is positively correlated with firm value. Not taking into account firm characteristics prior to refocusing, in this case, growth opportunities, may erroneously attribute the associated premium to multisegment operations of firms. This would lead to an underestimation of the discount associated with multisegment operations prior to refocusing. Controlling for firm characteristics, which make the refocusing decision optimal, may further increase the discount associated with multisegments operations of these firms. We document evidence in support of this view.

The rest of the paper is organized as follows. In the next section, we briefly discuss related literature. Section II describes the data, sample selection criteria, and preliminary analysis. Section III discusses the estimation methodology. Section IV presents the evidence for diversifying firms, and Section V does the same for refocusing firms. Section VI concludes.

I. Related Literature

There is a vast and well-developed literature on the benefits and costs of diversification. The gains from diversification could arise from many sources. Gains to diversification arise from managerial economies of scale as proposed by Chandler (1977) and from increased debt capacity as argued by Lewellen (1971). Diversified firms also gain from more efficient resource allocation through internal capital markets (see Weston (1970), Stulz (1990), and Stein (1997)). Gains to diversification also arise from the ability of diversified firms to internalize market failures (Khanna and Palepu (2000)). Hadlock, Ryngaert, and Thomas (2001) argue that diversified firms gain from a reduction of the adverse selection problem at the time of equity is-

[3] In a static model, the above arguments would suggest that when the net benefit to operating in multiple segments is negative, the firm should immediately refocus. In practice, the decision to diversify and refocus involves large amounts of sunk and irreversible costs that lead to a lot of persistence in diversification status. As yet, there is no clear understanding of the dynamic theory of a firm's diversification status, but one can draw an analog from recent theory on irreversible investment decisions (see Dixit and Pindyck (1994)). This literature has emphasized that temporary shocks can have permanent effects due to hysteresis, which is consistent with an observed discount of multiple segment firms prior to refocusing.

sues. Wernerfelt and Montgomery (1988) and Bodnar, Tang, and Weintrop (1997) propose gains to diversification based on the presence of firm-specific assets, which can be exploited in other markets. Schoar (1999) finds that diversified firms are more productive than others within their industry, though they still appear to be discounted.

There are costs to diversification as well. The costs can arise from inefficient allocation of capital among divisions of a diversified firm (see Stulz (1990), Lamont (1997), Scharfstein (1998), and Rajan, Servaes, and Zingales (2000)). The difficulty of designing optimal incentive compensation for managers of diversified firms also generates costs of multisegment operations (Aron (1988) and Rotemberg and Saloner (1994)). Information asymmetries between central management and divisional managers will also lead to higher costs of operating in multiple segments, as has been shown by Harris, Kriebel, and Raviv (1982). Last, costs of operating in multiple segments could arise because of increased incentive for rent seeking by managers within the firm (see Scharfstein and Stein (2000)) and opportunities for managers of firms with free cash flow to engage in value-destroying investments (see Jensen (1986, 1988)). Denis, Denis, and Sarin (1997) provide empirical evidence that agency costs are related to the diversification decision. Hyland (1999) examines firm characteristics including agency costs, and finds no support for the idea that agency costs explain the decision of firms to diversify.

Our focus in the paper is not in identifying any of the above-mentioned individual benefits and costs of diversification, but rather to concentrate on the net gain to diversification. Firms are likely to diversify when there are net gains to diversification and stay focused when there are net costs to diversifying. Most importantly for us, the above research shows that the benefits and costs of diversification are related to firm-specific characteristics. We control for firm characteristics that cause firms to diversify, that is, which generate a net gain to multisegment operations and isolate the net impact of the diversification decision.

Our paper is not the first to take into account the endogeneity of the diversification decision. A growing theoretical literature has been modeling the decision to diversify as a value-increasing strategy for the firm. Matsusaka (2001) develops a model in which the firm chooses to diversify when the gains from searching for a better organizational fit outweigh the costs of reduced specialization. Fluck and Lynch (1999) propose that diversification allows marginally profitable projects, which could not get financed as stand-alone entities, to be financed. Perold (1999) models the diversification decision in financial intermediaries and shows that diversification reduces a firm's deadweight costs of capital and so permits divisions to operate on a larger scale than stand-alone firms. Maksimovic and Phillips (2002) also develop a model where the firm optimally chooses the number of segments in which it operates, depending on its comparative advantage. They further show empirically that conglomerates allocate resources optimally, based on the relative efficiency of divisions. There has been other recent empirical work that provides evidence in support of the importance of selection bias

and the endogeneity of the diversification decision (Chevalier (2000), Lamont and Polk (2001), Whited (2001), Graham, Lemmon, and Wolf (2002), and Villalonga (2002)).

II. Data

A. Sample Selection

The sample consists of all firms with data reported on the Compustat Industry Segment database from 1978 to 1996. We follow the Berger and Ofek (1995) [henceforth BO(95)] sample selection criteria and exclude years where firms report segments in the financial sector (SIC 6000–6999), years with sales less than $20 million, years with a missing value of total capital, and years in which the sum of segment sales deviated from total sales by more than one percent. Additionally, we also excluded years where the firm did not report four-digit SICs for all its segments. The final sample consists of 8,815 firms with a total of 58,965 firm-years.

B. Measure of Excess Value

To examine whether diversification increases or decreases value, we use the excess value measure developed by BO(95), which compares a firm's value to its imputed value if each of its segments operated as single-segment firms. Each segment of a multiple-segment firm is valued using median sales and asset multipliers of single-segment firms in that industry. The imputed value of the firm is the sum of the segment values. Excess value is defined as the log of the ratio of firm value to its imputed value. Negative excess value implies that the firm trades at a discount, while positive excess values are indicative of a premium.[4]

C. Documenting the Discount

In this section, we document the existence of a discount in line with prior work. We find that the median discount on multisegment years is 10.9 per-

[4] The imputed value of a segment is obtained by multiplying segment sales (asset) with the median sales (asset) multiplier of all single-segment firm-years in that SIC. The sales (asset) multipliers are the median value of the ratio of total capital over sales (assets). Total capital is the sum of market value of equity, long-term and short-term debt, and preferred stock. The industry definitions are based on the narrowest SIC grouping that includes at least five firms. Extreme excess values, where the natural log of the ratio of actual to imputed value is greater than 1.386 or less than −1.386, were excluded. The imputed values using sales multipliers of about 50 percent of all firms were based on matches at the four-digit SIC code, 26.5 percent were based on matches at the three-digit SIC code, and 23.5 percent were based on matches at the two-digit or lower SIC code. The results using asset multipliers are similar. This is in line with the results reported in BO(95) of 44.6 percent matches at the four-digit level, 25.4 percent matches at the three-digit level, and 30 percent matches at the two-digit level or lower. See BO(95) for further details on methodology.

cent (11.6 percent) using sales (asset) multipliers for the entire sample from 1978 to 1996, similar to the discount of 10.6 percent (16.2 percent) reported by BO(95) for the years 1986 to 1991.[5] We begin by estimating a model of excess value as specified by BO(95) so as to guarantee that any differences in the final results are not driven by differences in sample or methodology. BO(95) model excess value as a function of firm size, proxied by the log of total assets, profitability (*EBIT/SALES*), investment (*CAPX/SALES*), and diversification, proxied by *D*, a dummy which takes the value 1 for years when the firm operates in multiple segments and 0 otherwise. As seen in Table I, the coefficient of *D* is −0.13 (−0.12) and significant at the one percent (one percent) level when sales (assets) multipliers are used. When we restrict the sample to the years 1986 to 1991, the coefficient of *D* is −0.12 (−0.13) using sales (asset) multipliers, which is close to the value of −0.144 (−0.127) reported by BO(95). The estimated discount in our sample is similar to that documented by BO(95).

We test the robustness of the estimated discount to model specification by including lagged values of firm size, profitability, and investment. Past profitability and investment may control for firm characteristics, which affect firm value. We also include the log of total assets squared to control for the possibility of a nonlinear effect of firm size on firm value. The coefficient of the square of firm size is negative, suggesting that the positive effect of firm size on excess value diminishes as firm size increases. We also include the ratio of long-term debt to total assets. The results, reported in columns 3 and 6 of Table I, show that the estimated discount is about 11 percent with both sales and asset multipliers. There is weak evidence that firms with high past profitability (high *EBIT/SALES*) and high past investments (high *CAPX/SALES*) are valued higher than the median single-segment firm in the industry, though the coefficients are not significant. Summarizing, multiple-segment firms show a significant discount, and this discount is robust to the inclusion of additional variables in the valuation equation. We report all results with this extended model.

[5] For the years 1986 to 1991, we find that the median multiple segment discount in our sample is 7.6 percent (10.3 percent) using a sales (asset) multiplier. This difference with the BO(95) results is possibly due to a difference in sample size. The number of firm-years in the period 1986 to 1991 in our sample is 17,875, greater than the 16,181 reported by BO(95). There are 4,565 firms in our sample as opposed to 3,659 firms reported by BO(95). Our sample size after deleting observations with missing values is larger by 1,142 (977) observations when using sales (asset) multiplier regressions. This increase in the sample size could arise on two accounts. First, if firms restate their results such that they are no longer excluded due to one or more sample selection criteria, they might be included in our sample while not being included in BO(95)'s sample. Second, Compustat might add firms to the database along with the data for prior years. The largest category in this group (according to Compustat sources) consists of small firms that trade on OTC markets and are added when they change listing or on client request. Our overall sample, from 1978 to 1996, of 8,815 firms and 58,965 observations is similar to the sample of 8,467 firms and 58,332 observations reported by Graham et al. (2002).

Table I

Estimation of the Diversification Discount

The dependent variable is excess value, defined as the log of the ratio of total market value to imputed value using median industry multipliers. The variable *D* is a dummy, which takes the value 1 when the firm operates in multisegments and 0 otherwise. The variable *EBIT/SALES* is the ratio of *EBIT* to sales, and *CAPX/SALES* is the ratio of capital expenditures to sales. *LEV* is the ratio of long-term debt to total assets, and *ASS2* is the square of the log of total assets. The second and fifth columns report the estimation of the BO(95) specification for the full sample, while columns 3 and 6 report the estimation of the BO(95) specification for the years 1986 to 1991. Columns 4 and 7 report the results of the extended model for the full sample (1978 to 1996). The *t*-statistics are reported in parentheses.

	Sales Multiplier			Asset Multiplier		
	BO 1978–1996	BO 1986–1991	Extended BO 1978–1996	BO 1978–1996	BO 1986–1991	Extended BO 1978–1996
Constant	−0.29	−0.32	−0.77	−0.07	−0.09	−0.45
	(39)	(24)	(36)	(10)	(7.76)	(24)
D	−0.13	−0.12	−0.11	−0.12	−0.13	−0.11
	(26)	(12)	(20)	(27)	(14)	(21)
Log of Total Assets	0.03	0.04	0.52	0.00	0.01	0.36
	(22)	(17)	(43)	(0.35)	(3.67)	(33)
CAPX/SALES	0.33	0.29	0.17	0.05	0.03	−0.05
	(25)	(12)	(10)	(5)	(1.70)	(3.77)
EBIT/SALES	1.05	0.95	0.86	0.82	0.73	0.76
	(57)	(31)	(42)	(56)	(30)	(45)
Log of Total Assets (1 lag)			−0.16			−0.09
			(11)			(−7.17)
CAPX/SALES (1 lag)			0.05			0.01
			(4.15)			(1.20)
EBIT/SALES (1 lag)			0.00			0.00
			(0.47)			(1.40)
Log of Total Assets (2 lag)			−0.19			−0.15
			(22)			(20)
CAPX/SALES (2 lag)			0.00			0.00
			(0.86)			(1.35)
EBIT/SALES (2 lag)			0.00			0.00
			(0.71)			(0.64)
LEV			0.10			0.01
			(8.26)			(0.78)
ASS2			−0.01			−0.01
			(17)			(15)
Number of observations	54,451	16,429	45,291	52,126	15,524	43,194
Adjusted R^2	0.11	0.11	0.17	0.08	0.08	0.12

D. Are Multisegment Firms Different?

In this section, we examine the characteristics of conglomerates that might cause them to diversify. We also examine if conglomerates differ from single-segment firms in their underlying characteristics.

Table II

Distribution of Firms by Diversification Profiles

This table reports the breakdown of firms in our sample by different diversification profiles. The sample consists of all firms reported in Compustat, from 1978 to 1996, subject to the sample selection criteria described in the text. All the data for the firm were used to classify firms into the categories (rather than just the years, which would be included after the sample selection criteria have been employed).

	Firm-years	Number of Firms
Firms that were always in single segments	30,284	5,387
Firms that diversified	4,326	606
Firms that diversified once from one segment to multiple segments	2,519	379
Firms that diversified once from multiple segments to multiple segments	791	105
Firms that diversified multiple times	1,016	122
Firms that refocused	7,987	873
Firms that refocused once from multiple segments to single segments	3,633	422
Firms that refocused once from multiple segments to multiple segments	1,588	183
Firms that refocused multiple times	2,766	268
Firms that both focused and diversified	13,133	1,371
Multisegment firms that did not change the number of segments	3,235	578
Total	58,965	8,815

The 8,815 firms in our sample differ in their diversification profiles. The largest group consists of 5,387 single-segment firms, which accounted for 30,284 firm-years, as shown in Table II. The rest of the firms report operating in multiple segments at some point in the time period under consideration. These firms will be referred to as multiple-segment firms or conglomerates in the paper. Among these multiple-segment firms, there were broadly four kinds: Firms which diversify, those that refocus, those that do both, and last, conglomerate firms that do not change the number of segments in which they operate. The largest group consists of 1,371 firms (13,133 firm-years) that report both increasing and decreasing the number of segments in this time period. The next largest group consists of 873 firms (7,987 firm-years) that refocused. There are 606 firms (4,326 firm-years) that report diversifying in this period.[6]

Next, we examine the characteristics of single-segment and multiple-segment firm-years. Table III reports average value of firm size, investment, profitability, leverage, research and development, and industry growth rates for the different diversification profiles. Industry growth rate is the increase in industry sales, defined at the two-digit SIC level. SIC classification was

[6] Firms were classified using all available data, that is, the years excluded due to sample selection criteria were also taken into account for the purpose of categorizing firms. This ensures that restructuring activity in years that were excluded from the sample is also taken into account.

Table III

Summary Statistics by Diversification Profile

The table displays descriptive statistics for firms classified according to their diversification profile. Total assets are measured in millions of dollars. The value *CAPX/SALES* is the ratio of capital expenditures to total sales, *EBIT/SALES* is the ratio of *EBIT* to total sales, *DEBT/TA* is the ratio of long term debt to total assets, *INDGROW* is the growth in industry sales in the previous year, and *R&D/SALES* is the ratio of R&D expenditure to sales.

	Total Assets		*CAPX/SALES*		*EBIT/SALES*		*DEBT/TA*		*INDGROW*		*R&D/SALES*	
	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Were always single segment firms	4.50	4.71	0.05	0.10	0.08	0.09	0.14	0.19	8.80	10.93	0.02	0.06
All firms that diversify	5.28	5.54	0.05	0.12	0.10	0.12	0.19	0.22	7.97	9.75	0.02	0.03
Single-segment years	5.01[a]	5.27[a]	0.05[a]	0.12[a]	0.10[a]	0.13[a]	0.17[a]	0.21[a]	8.80	10.67	0.02	0.04[a]
Multiple-segment years	5.57	5.72	0.06	0.11	0.10	0.10	0.21	0.23	7.86	9.18	0.02	0.03
All firms that refocus	5.05	5.23	0.04	0.08	0.08	0.08	0.19	0.21	7.68	9.39	0.02	0.03
Single-segment years	4.82[a]	5.02[a]	0.04[a]	0.09	0.07[a]	0.08[a]	0.18[a]	0.21[a]	8.05[a]	9.62[a]	0.02[a]	0.04[a]
Multiple-segment years	5.19[c]	5.36[c]	0.04[c]	0.07[c]	0.08[c]	0.09[c]	0.19[c]	0.21[c]	7.51[d]	9.21	0.02[d]	0.03[c]
Multisegment firms with no change in diversification status	5.14[c]	5.31[c]	0.05[c]	0.08[c]	0.10	0.11[d]	0.19[d]	0.20[c]	7.68	9.12	0.01[c]	0.02[c]
Firms that both focused and diversified	5.53	5.67	0.04	0.08	0.08	0.08	0.21	0.24	8.02	9.58	0.01	0.03
Single-segment years	4.86[a]	5.12[a]	0.04[a]	0.09[b]	0.08[a]	0.09	0.22[a]	0.25[a]	8.06[b]	9.84[a]	0.01[a]	0.03[a]
Multiple-segment years	5.84[c]	5.90[c]	0.05[c]	0.08[c]	0.08[c]	0.08[c]	0.21	0.24	7.95	9.47	0.01[c]	0.02[c]

[a] The difference with single-segment firms is significant at one percent.
[b] The difference with single-segment firms is significant at five percent.
[c] The difference with multiple-segment years of diversifying firms is significant at one percent.
[d] The difference with multiple-segment years of diversifying firms is significant at five percent.

obtained from the business segment data. Divisional sales for conglomerates were included in the respective SIC's for the calculation of total industry sales.[7]

Single-segment years of conglomerates are significantly different from single-segment firms in their characteristics. Single-segment years of conglomerates are bigger, have higher leverage, and lower R&D than single-segment firms. This is consistent with Hyland (1999), who finds that diversifying firms have lower research and development expenses. With regard to *CAPX/SALES* and *EBIT/SALES*, not only do single-segment years of conglomerates differ from single-segment firms, but they also differ significantly among them. Single-segment years of diversified firms have higher *CAPX/SALES* and higher *EBIT/SALES*, while single-segment years of refocusing firms and firms that both refocus and diversify have lower *CAPX/SALES* and lower *EBIT/SALES* than single-segment firms. In summary, firm characteristics differ across single-segment years in different diversification profiles.

There are also significant differences in the characteristics of multisegment years of conglomerates. Multiple-segment years of diversifying firms tend to invest more in research and development (*RND/SALES*) than others. They also have higher capital investment (*CAPX/SALES*) and higher profitability (*EBIT/SALES*) than multiple-segment years of refocusing firms and firms which both refocus and diversify. Conglomerates that do not change diversification status seem to be in mature industries with lower growth and have low research and development expenses, while enjoying higher profitability (*EBIT/SALES*) and higher capital investment (*CAPX/SALES*). Multiple-segment years of refocusing firms tend to have the lowest profitability and capital investment. This suggests that difference in characteristics of multiple-segment years might be related to the choice of diversification strategy.

Next, we examine the characteristics of the discount over time and across the different diversification profiles. Table IVa documents the average annual discount from 1978 to 1996 estimated using sales and asset multipliers. There is substantial variation, with the median discount using sales multipliers being as low as -0.058 in 1982 and 0 for years 1987 to 1991. The excess value measures firm value relative to the median single-segment firm in the industry for that year. This makes the excess value measure industry neutral and time neutral. What generates these time patterns in the excess value measure?

Time patterns in the excess value measure could arise due to two factors. First, the distribution of single-segment firms around the median could change. As can be seen from Columns 2 and 3 of Table IVb, though the median excess value of all single-segment firm-years used to estimate industry mul-

[7] Total industry sales is a function of firms entering and leaving Compustat and of restructuring activities of firms as well as accounting changes that cause firms to report sales in different SICs over the years. These growth rates, therefore, have been estimated with a lot of noise.

Table IVa

The Distribution of Excess Value over Time

This table displays summary statistics for the estimated excess value using sales and asset multipliers over time. The table includes all firm years, single segment as well as multiple segments.

	Sales Multiplier				Asset Multipliers			
	Median	Mean	Std. Dev.	Number	Median	Mean	Std. Dev.	Number
1978	−0.026	−0.044	0.493	2438	−0.017	−0.025	0.396	2281
1979	−0.040	−0.056	0.507	2393	−0.033	−0.053	0.430	2278
1980	−0.032	−0.057	0.542	2393	−0.028	−0.039	0.461	2257
1981	−0.057	−0.084	0.544	2527	−0.048	−0.078	0.456	2347
1982	−0.058	−0.074	0.549	2470	−0.040	−0.055	0.465	2327
1983	−0.052	−0.071	0.541	2643	−0.030	−0.045	0.453	2454
1984	−0.028	−0.045	0.538	2703	−0.022	−0.031	0.440	2536
1985	−0.030	−0.045	0.536	2690	−0.024	−0.025	0.446	2484
1986	−0.028	−0.041	0.539	2781	−0.031	−0.025	0.441	2578
1987	0.000	−0.013	0.553	2885	−0.017	−0.018	0.456	2729
1988	0.000	−0.022	0.543	2808	−0.005	−0.010	0.443	2693
1989	0.000	−0.009	0.553	2712	−0.002	−0.001	0.472	2632
1990	0.000	−0.028	0.578	2708	−0.006	−0.012	0.491	2626
1991	0.000	−0.033	0.576	2771	−0.011	−0.025	0.520	2697
1992	−0.017	−0.042	0.578	3049	−0.023	−0.026	0.524	2994
1993	−0.019	−0.039	0.572	3403	−0.024	−0.029	0.514	3332
1994	−0.020	−0.036	0.567	3682	−0.015	−0.029	0.495	3632
1995	−0.009	−0.027	0.583	3896	−0.011	−0.010	0.516	3895
1996	−0.005	−0.029	0.597	4182	−0.005	−0.013	0.522	4252

tipliers is 0 by construction, the mean varies from −0.02 in 1992 to +0.01 in 1989. Second, time effects could also arise because of the entry and exit of firms in the sample. Table IVb, columns 3 through 6, documents the median annual excess values (using sales multipliers) for the last and first year of firms in the data. There are two interesting facts that emerge from Table IVb. First, firms have negative excess value in the last year in the data. This effect is not limited to just the last year in the data set, but these firms are, on average, discounted. We refer to these firms that exit the sample, that is, are included in the Compustat research tapes, as exiting firms. In contrast, new firms in the data set have positive excess values in their first year. These new firms entering the data set are valued systematically higher relative to the median single-segment firm in the industry. Second, there is variation over time in the number of firms exiting and entering the data. Exit (entry) of firms with low (high) excess values reduces (raises) the median industry multiplier in that year, consequently increasing (decreasing) the relative valuation of existing firms in the industry. Though the median excess value of single-segment years has been normalized to zero, the median excess values of conglomerates will have a time pattern related to the changes in industry composition rather than to changes in its intrinsic value.

Table IVb

Effect of Changes in Industry Composition on Excess Value

The table reports results of excess value measured using sales multipliers. Column 2 shows mean excess values for single-segment firm-years. Median excess values are zero by construction. Column 3 shows the median excess values for the last year of firms in the data, column 4 shows the number of such firms, column 5 shows the median excess value for the first year of firms in the data, and column 6 shows the number of such firms.

Year	Mean	Median (for Last Year in Sample)	Number of Firms with Last Year	Median (for First Year in Sample)	Number of Firms with First Year
1978	0.0	0.019	78		
1979	−0.008	−0.026	73	0	106
1980	−0.005	0	66	0.098	107
1981	−0.015	−0.061	84	0	203
1982	−0.012	−0.063	81	0.112	116
1983	−0.000	−0.165	134	0.135	234
1984	0.011	−0.037	128	0.089	227
1985	0.011	−0.024	147	0.134	201
1986	−0.004	−0.041	152	0.105	274
1987	0.006	−0.14	211	0.072	269
1988	−0.006	−0.126	179	0.139	206
1989	0.011	−0.011	117	0.129	175
1990	−0.009	−0.197	119	0.078	158
1991	−0.011	−0.286	90	0.207	225
1992	−0.019	−0.15	117	0.259	280
1993	−0.009	−0.112	175	0.159	394
1994	−0.009	−0.063	253	0.109	397
1995	−0.013	−0.125	271	0.144	433
1996	−0.013			0.158	500

This would not be of much concern in the estimation of the impact of the diversification status on firm value if firms enter and exit the sample randomly. This is because values of all firms, single and conglomerate, change proportionately over time, leaving the relative valuation of multiple-segment firm-years unchanged. However, if changes in industry composition are not random, but related to the decision of firms to diversify or refocus, then changes in industry composition become a source of concern. Consider, for instance, a firm that diversifies when poor performing firms in the industry exit because of few growth opportunities in the industry. Exit of poor performers raises the median industry multiplier and increases the imputed value of the diversifying firm when it diversifies. This will cause the firm to trade at a discount after diversification. This discount is due to a change in industry composition (exit of poor performers), which is correlated with the decision to diversify rather than due to any change in the firm's intrinsic value.

To examine whether changes in industry composition differ by diversification decision, we study the distribution and percentage sales accounted for by exiting firms. For each firm, we calculate the share of sales accounted for

by exiting firms in their industry (at the two-digit SIC level) for that year. For conglomerates, we weight each segment's exposure to exiting firms by its sales. We also calculate the fraction of all firms in an industry that exit. Table IVc documents the percentage of exiting firms in each industry for the different diversification profiles and highlights some interesting patterns. Single-segment years of diversifying firms operate in industries with the highest incidence of exit. In these industries, 28 percent of all firms exit in a given year and the exiting firms account for 15 percent of industry sales. Single-segment firms in contrast belong to industries where exiting firms account for only 14 percent of all firms and 6 percent of industry sales. While single-segment years of diversifying firms have the highest exposure to exiting firms, multiple-segment years of diversifying firms have one of the lowest exposures to exiting firms. In contrast, single-segment years of refocusing firms operate in industries with the lowest fraction of exiting firms, while multiple-segment years of refocusing firms tend to be in industries with the highest incidence of exiting firms. We observe that firms move towards industries where the exit rate is low. This is suggestive of the fact that firms both diversify and refocus, from industries experiencing difficulties (higher exit) into industries with better prospects (lower exit). This also supports the finding in Lang and Stulz (1994) that diversifying firms tend to be in bad industries characterized by higher exit. This is consistent with our view that firms endogenously choose to diversify and refocus and is indicative of the fact that changes in industry composition are related to the firm's diversification strategy.

Firms also show systematic patterns in their discounts prior to whether they decide to diversify or exit the industry. Single-segment years of diversifying firms do not trade at a discount. This indicates that these firms do not do badly compared to the median firm in the industry prior to diversifying. However, as seen from Table IVc, these firms are in industries with a high incidence of exit. Combining these two results suggests that single segment years of diversifying firms might be better than the firms that exit the industry, but worse than the firms that continue as single-segment firms in the industry, which is confirmed in Table IVd. Single-segment years of diversifying firms which do not exit have a median discount of zero. This is better than the four percent discount for single-segment firms in the same four-digit SIC that exit and worse than the two percent premium for single-segment firms in the same four-digit SIC that do not exit.

Summarizing, there are significant differences in firm characteristics between single-segment firms and single-segment years of conglomerates. There are also significant differences in firm characteristics between multiple-segment years of conglomerates with different diversification profiles. There are also differences in industry composition over time. Firms that diversify (focus) come from industries with high exit rates. These firms have excess values prior to diversification that are higher than those of firms that exit the industry but lower than those of firms that remain as single-segment firms. These changes in industry composition seem to be correlated with the

Table IVc

Summary Statistics for the Distribution of Exiting Firms

This table displays the distribution of firms that exit the sample (moved to the research files in the COMPUSTAT database). The percentage share of these firms in sales is the percentage of overall industry sales in a given year (defined at the two-digit SIC level) accounted for by all exiting firms in the sample. For a conglomerate, we take the sales weighted average of each segment. Similarly, the percentage of exiting firms in the industry is the fraction of all firms in the industry (defined at the two-digit SIC) in a given year accounted for by firms in the research file.

	Percent Share of Exiting Firms in Industry Sales				Percentage of Exiting Firms in Industry			
	Median	Mean	Std. Dev.	Number	Median	Mean	Std. Dev.	Number
Single-segment firms	6.44	11.22	13.2	21,794	14.28	19.87	18.7	21,794
Single-segment years of conglomerates	9.74	14.00	13.9	6,615	21.94	24.94	18.8	6,615
Multiple-segment years of conglomerates	13.09	15.75	13.2	13,831	27.28	28.63	19.0	13,831
Diversifying firms	9.65	13.31	12.7	3,287	21.71	24.07	17.9	3,287
Single-segment years of diversifying firm	15.14	17.60	13.4	1,424	28.47	31.24	16.5	1,424
Multiple-segment years of diversifying firm	6.13	10.04	11.1	1,863	14.53	18.59	16.9	1,863
Focusing firms	11.56	14.91	13.2	4,934	26.35	27.74	19.2	4,934
Single-segment years of focusing firms	5.82	9.89	11.2	2,024	14.52	19.12	17.1	2,024
Multiple-segment years of focusing firms	17.02	18.40	13.3	291	37.00	33.7	18.2	291
Firms that both diversify and focus	13.19	16.12	13.8	10,444	27.84	28.79	19.1	10,444
Single-segment years	10.80	15.00	15.0	3,167	22.78	25.84	19.6	3,167
Multiple-segment years	14.13	16.60	13.2	7,277	30.36	30.08	18.8	7,277
Conglomerates that did not change diversification status	9.87	13.95	12.9	1,781	21.82	24.88	18.9	1,781

Table IVd

Exiting Firms and Excess Value

This table documents summary statistics for excess value of single-segment years of diversifying firms that did not exit, single-segment firms in the same industry that did not exit and did not diversify, and single-segment years of firms in the same industries that exited. It also displays the above for firms that refocus.

	Sales Multipliers				Asset Multipliers			
	Median	Mean	Std. Dev.	Number	Median	Mean	Std. Dev.	Number
Single-segment firms that do not exit[a]	0.02	0.04	0.57	11,771	0.012	0.05	0.5	12,279
Single-segment years of diversifying firms	0.0	−0.004	0.53	1,327	0	0.02	0.45	1,390
Single-segment firms that exit[b]	−0.04	−0.08	0.56	5,511	−0.03	−0.05	0.48	5,736
Single-segment firms that do not exit[c]	0.02	0.04	0.57	12,442	0.01	0.05	0.5	12,946
Single-segment years of focusing firms	0.0	−0.01	0.54	1,919	0.0	0.0001	0.47	1,992
Single-segment firms that exit[d]	−0.07	−0.10	0.54	5,610	−0.05	−0.07	0.47	5,825

[a]This group consists of single-segment firms that did not exit, that is, were not included in the research tapes in Compustat. In addition, these firms were in the same four-digit SIC as the single-segment years of diversifying firms.
[b]This group consists of single-segment years of firms that exited the sample and were in the same four-digit SIC as the single-segment years of diversifying firms.
[c]This group consists of single-segment firms that did not exit and were in the same four-digit SIC as the single-segment years of focusing firms.
[d]This group consists of single-segment years of firms that exited the sample and were in the same four-digit SIC as the single-segment years of focusing firms.

decision to diversify and refocus. We will try to control for both firm-specific changes as well as these industry-specific changes that might cause the decision to diversify/refocus to be correlated with the estimated discount. The next section discusses the methodology to control for this endogeneity.

III. Estimation Methodology

We examine the effect of diversification on firm value by modeling firm value as a function of firm characteristics. We define our measure of relative firm value, V_{it} as

$$V_{it} = \delta_0 + \delta_1 X_{it} + \delta_2 D_{it} + e_{it}, \tag{1}$$

where X_{it} is a set of exogenous observable characteristics of the firm, D_{it} is a dummy variable that takes the value of 1 if the firm operates in more than one segment and 0 otherwise, $\delta = \{\delta_0, \delta_1, \delta_2\}$ is a vector of parameters to be estimated, and e_{it} is an error term.

Our hypothesis is that firms that choose to diversify are not a random sample of firms. If a firm's decision to diversify is correlated with the relative value of the firm, D_{it} will be correlated with the error term in equation (1). The OLS estimate of δ_2 will, therefore, be biased. Specifically, we assume that a firm's decision to diversify is determined by

$$D_{it}^* = \beta Z_{it} + \mu_{it} \tag{2}$$

$$D_{it} = 1 \quad \text{if } D_{it}^* > 0$$

$$D_{it} = 0 \quad \text{if } D_{it}^* < 0,$$

where D_{it}^* is an unobserved latent variable, Z_{it} is a set of firm characteristics that affect the decision to diversify, and μ_{it} is an error term. The correlation between D_{it} and e_{it} in equation (1) will arise when (a) some of the exogenous variables in the diversification equation, Z_{it}, affect the firm's relative value but are not included as regressors in the value equation; or (b) the errors e_{it} and μ_{it} are correlated. In either case, the estimation of δ_2 using OLS will be biased.

We use three different techniques to control for the correlation between D_{it} and e_{it} in equation (1) and come up with an unbiased estimator of δ_2. First, we take advantage of a panel data set and use a fixed-effect estimator in equation (1), assuming that all the unobserved heterogeneity that leads to the correlation between the error terms is constant over time.

Second, we attempt to jointly estimate equations (1) and (2) in a simultaneous equation framework. The estimation of this system of simultaneous equations is not easy because the natural instruments for D_{it}, the observed firm characteristics, are already included in the firm value equation (equation (1)), causing the system to be unidentified.[8] The characteristic of a good instrument for diversification is such that it is not correlated with the error e_{it} in equation (1) and that it is correlated with diversification D_{it}. We have identified two sets of valid instruments. The first set consists of industry and time characteristics, and the second set consists of firm characteristics.

Lang and Stulz (1994) and Maksimovic and Phillips (2002) show that industry characteristics influence the decision to diversify. We have also documented systematic patterns at the industry level that result in a correlation between a firm's relative value and its decision to diversify. As V_{it} is the firm's *value relative* to the median firm in the industry in any given year, it

[8] Strictly speaking, identification could be obtained only from the nonlinearity of D_{it} in equation (2), but exclusively relying on the functional form will lead to very weak identification.

is, by construction, independent of any observable characteristics that affect the value of all firms in a given industry and year in the same manner.[9] Given that our instruments predict the decision to diversify and do not affect relative value directly, they proxy for the effect of diversification on excess value.[10]

Industry instruments capture overall attractiveness of a given industry to conglomerates. Industry attractiveness is captured by the fraction of all firms in the industry which are conglomerates (*PNDIV*). The higher the fraction of multisegment firms (*PNDIV*), the more attractive the industry factors are to diversification.[11] We also include for each firm, the fraction of sales by other firms in the industry accounted for by diversified firms (*PSDIV*). As both these variables are highly correlated, we evaluate them jointly to determine the effect of industry factors on the diversification decision. We instrument time effects on the diversification decision in various ways. First, we capture time trends as evidenced by the existence of merger waves. We include the number of merger/acquisition announcements in a given year (*MNUM*). The more active the market for mergers/acquisitions, the higher is the probability that a firm will diversify. We also include the annual value of announced merger/acquisitions, in billions of U.S. dollars (*MVOL*). Second, we capture time trends in the macroeconomic conditions and business cycles. We include real growth rates of gross domestic product (*GDP*) and its lagged value (*GDP1*). We also include the number of months in the calendar year that the economy was in a recession (*CONTRAC*) and its lagged value (*CONTRAC1*).[12]

The second set of instruments is firm specific. These include *MAJOREX*, *SNP*, and *FOREIGN*. The variable *MAJOREX* is a dummy that takes the value 1 when the firm is listed on NYSE, Nasdaq, or AMEX, and 0 otherwise. Firms are more likely to diversify or refocus if they are listed on the major exchanges. Listing on major exchanges facilitates a firm's acquisition and divestiture by generating greater visibility and reducing information asymmetries (making it easier to raise external financing) through greater analyst coverage. However, firms listed on major exchanges are also likely to have greater liquidity. As firms with higher liquidity might be valued higher, this might also affect relative firm value. We create a dummy variable (*SNP*)

[9] Note that the estimation of equation (1), where V_{it} is defined as firm value relative to the median firm in an industry, is almost analogous to the estimation of an industry fixed-effect estimator.

[10] As discussed in the previous section, there is entry and exit of firms as well as changes in the fraction of diversified firms in the industry. Both these effects cause variation in the excess value measure of diversified firms (not single-segment firms), that is, it is only through diversification that the industry and time instruments affect relative firm value.

[11] The industry-specific factors influencing the decision to diversify may range from changes in industry regulation, market structure, and technology, to business risk. We use two-digit SIC codes for industry classification.

[12] We thank Scott Mayfield for the suggestion of using merger waves and René Stulz for the suggestion of using business cycles to instrument for time trends. The data on merger volume and number are from Securities Data Corporation, and the data on GDP growth rates and business cycles are from NBER.

that takes the value 1 if the firm belongs to the S&P industrial index or the S&P transportation index, and 0 otherwise. This dummy variable (*SNP*) controls for liquidity, as firms belonging to the S&P index have higher liquidity. As liquidity impacts both relative firm value and the decision to diversify, we include this *SNP* variable in both equations (1) and (2). Finally, we create a dummy (*FOREIGN*) that takes the value 1 when the firm is incorporated abroad and 0 otherwise. Foreign firms might list in the United States prior to major financing or as part of acquisition/corporate restructuring strategy. Foreign firms are, therefore, more likely to engage in both diversification and refocusing activities. Though being foreign may predict the probability of diversifying and refocusing, it does not affect relative firm value. These firm-specific instruments make valid instruments to the extent that they do not affect relative firm value independently, except through making diversification more or less likely. We also control for average firm characteristics by including the historical average value of the log of total assets, *EBIT/Sales*, and *CAPX/Sales*.

The third method to control for endogeneity is to control for the self-selection of firms that diversify using Heckman's (1979) two-stage procedure. We estimate expected firm value conditional on the firm being diversified as $E(V_{it}|D_{it} = 1) = \delta_0 + \delta_1 X_{it} + \delta_2 + E(e_{it}|D_{it} = 1)$. Assuming that the errors in equations (1) and (2), e_{it} and μ_{it}, have a bivariate normal distribution with means zero, standard deviation σ_e and 1, and with correlation ρ, we have $E(e_{it}|D_{it} = 1) = \rho\sigma_e\lambda_1(\beta Z_{it})$, where

$$\lambda_1(\beta Z_{it}) = \frac{\phi(\beta Z_{it})}{\Phi(\beta Z_{it})},$$

$\phi(.)$ and $\Phi(.)$ are, respectively, the density and cumulative distribution functions of the standard normal. Similarly, the expected value conditional on the firm being focused is $E(V_{it}|D_{it} = 0) = \delta_0 + \delta_1 X_{it} + E(e_{it}|D_{it} = 0)$. In this case, $E(e_{it}|D_{it} = 0) = \rho\sigma_e\lambda_2(\beta Z_{it})$, where

$$\lambda_2(\beta Z_{it}) = \frac{-\phi(\beta Z_{it})}{1 - \Phi(\beta Z_{it})}.$$

The difference in the value of single-segment and diversified firms is given by

$$E(V_{it}|D_{it} = 1) - E(V_{it}|D_{it} = 0) = \delta_2 + \rho\sigma_e \frac{\phi(\beta Z_{it})}{\Phi(\beta Z_{it})(1 - \Phi(\beta Z_{it}))}. \tag{3}$$

The right-hand side of the equation (3) is what is estimated by the OLS coefficient of D_{it} in equation (1). This estimated discount, using OLS, will, therefore, be biased downward if ρ, the correlation of the error terms, is negative, as hypothesized for diversifying firms. The estimated discount will be biased upward if ρ is positive, as hypothesized for refocusing firms.

In line with Heckman's two-step procedure, we first estimate equation (2) using a probit model to get consistent estimates of β denoted by $\hat{\beta}$. These are then used to get estimates of λ_1 and λ_2, the correction for self-selection. In the second step, we estimate δ by estimating

$$\begin{aligned} V_{it} &= \delta_0 + \delta_1 X_{it} + \delta_2 D_{it} + \delta_\lambda [\lambda_1(\hat{\beta} Z_{it}) * D_{it} + \lambda_2(\hat{\beta} Z_{it}) * (1 - D_{it})] + \eta_{it} \\ &= \delta_0 + \delta_1 X_{it} + \delta_2 D_{it} + \delta_\lambda \lambda + \eta_{it}, \end{aligned} \tag{4}$$

where $\delta_\lambda = \rho \sigma_e$. The sign of δ_λ is determined by the sign of ρ, the correlation between the error terms in equations (1) and (2). We separately examine diversifying and refocusing firms and control for the endogeneity of the diversification/refocusing decision.[13]

IV. Diversifying Firms

We select a sample of all single-segment firms and all diversifying firms. Diversifying firms included in the sample are those that diversify once from single to multiple segments, those that diversify once from multiple to multiple segments, and those that diversify multiple times.[14] In this sample, we examine whether or not there is any loss of value associated with operating in multisegments. We first estimate the model by OLS. Columns 2 and 7 in Table V report the results of the estimation of the BO(95) model in this sample. The estimated multisegment discount is -0.13 (-0.11) using sales (asset) multipliers and is similar to the discount reported for the entire sample in Table I. With the extended model (columns 3 and 8), the discount using sales (asset) multiples is -0.11 (-0.09) and is also significant at the one percent (one percent) level.

A. *Fixed-effect Estimation*

As discussed in the previous section, we introduce fixed firm effects to control for unobservable firm characteristics and year effects to control for time effects which affect the diversification decision. As seen in Table V, the introduction of two-way fixed effects reduces the estimated discount to six percent (four percent), significant at the one percent (five percent) level with sales (asset) multipliers.

The introduction of firm fixed effects reduces the interfirm variability in the data and might increase the noise-to-signal ratio in the estimation. However, the signs and significance of the coefficients on all other variables,

[13] Given our lack of understanding of the full dynamics of diversification and refocusing by firms, we condition the sample based on whether firms choose to diversify or to refocus rather than pool all observations in one sample.

[14] To ensure that the sample of firms stays the same across all methods, firms with only one year of data have been removed. These firms would have been excluded in the fixed-effects estimation. Further, outliers have also been excluded.

Table V

Effect of Multiple Segment Operations on Firm Value of Diversifying Firms

The sample consists of single-segment firms and all diversifying firms. The dependent variable is excess value, which is the ratio of firm value to its imputed value. The variable *D* is a dummy that takes the value 1 when the firm operates in multisegments and 0 otherwise. *EBIT/SALES* is the ratio of *EBIT* to sales, and *CAPX/SALES* is the ratio of capital expenditures to sales. The variable *SNP* is a dummy that takes the value of 1 when the firm is part of the S&P index and 0 otherwise, *LEV* is the ratio of long-term debt to total assets, and *ASS2* is the square of the log of total assets. Columns 2 to 6 (columns 7 to 11) report results when sales (asset) multipliers are used to calculate imputed value. Year dummies were included in the instrumental variable (IV) model as well as the self-selection model and are not reported. The fixed-effects model has two-way fixed effects. The standard errors are corrected for autocorrelation, and the corresponding *T*-statistics are given in parentheses below.

	Sales Multipliers					Asset Multipliers				
	OLS (BO)	OLS	Fixed Effects	IV	Self-selection	OLS (BO)	OLS	Fixed Effects	IV	Self-selection
Constant	−0.36	−0.75	−0.09	−0.72	−0.68	−0.14	−0.43	0.68	−0.34	−0.32
	(33)	(26)	(1.67)	(30)	(30)	(14)	(17)	(14)	(15)	(15)
D	−0.13	−0.11	−0.06	0.30	0.18	−0.11	−0.09	−0.04	0.19	0.01
	(10)	(9.13)	(2.88)	(5.03)	(4.03)	(9.09)	(7.94)	(2.08)	(3.29)	(0.24)
Log of total assets	0.04	0.61	0.33	0.55	0.54	0.01	0.42	0.00	0.24	0.24
	(19)	(36)	(16)	(40)	(39)	(4.75)	(28)	(0.24)	(19)	(18)
EBIT/SALES	1.15	0.69	0.39	0.44	0.44	0.98	0.77	0.71	0.63	0.62
	(42)	(19)	(13)	(13)	(13)	(44)	(26)	(27)	(16)	(15)
CAPX/SALES	0.33	0.06	0.19	0.16	0.16	0.04	−0.06	−0.03	−0.02	−0.02
	(15)	(1.96)	(7.25)	(5.65)	(5.68)	(2.22)	(2.38)	(1.44)	(0.98)	(0.90)
Log of TA (1 lag)		−0.25	−0.28	−0.25	−0.25		−0.15	−0.12	−0.04	−0.04
		(12)	(19)	(13)	(13)		(8.10)	(8.75)	(2.32)	(2.50)
EBIT/SALES (1 lag)		0.20	0.16	0.20	0.20		0.07	0.14	0.10	0.10
		(5.57)	(5.99)	(5.49)	(5.42)		(2.18)	(6.11)	(2.31)	(2.28)
CAPX/SALES (1 lag)		0.08	0.05	0.09	0.09		−0.05	−0.04	−0.01	−0.02
		(2.45)	(2.04)	(3.51)	(3.40)		(1.91)	(1.89)	(0.67)	(0.86)
Log of TA (2 lag)		−0.20	−0.14	−0.14	−0.14		−0.17	−0.11	−0.12	−0.12
		(16)	(14)	(13)	(13)		(16)	(13)	(12)	(12)
EBIT/SALES (2 lag)		0.09	0.09	0.08	0.08		−0.02	0.05	−0.003	−0.002
		(3.58)	(4.84)	(3.14)	(3.19)		(1.06)	(3.02)	(0.11)	(0.09)
CAPX/SALES (2 lag)		0.08	0.06	0.07	0.07		0.05	0.02	0.04	0.04
		(3.65)	(3.08)	(3.94)	(3.80)		(2.78)	(1.08)	(2.79)	(2.65)
SNP				0.25	0.25				0.29	0.28
				(27)	(28)				(33)	(33)
LEV		−0.03	0.22	0.09	0.11		−0.06	0.12	0.03	0.04
		(1.48)	(10)	(6.81)	(8.11)		(3.94)	(5.72)	(2.21)	(3.61)
ASS2		−0.01	0.01	−0.01	−0.01		−0.01	0.01	−0.01	−0.01
		(11)	(6.12)	(19)	(19)		(10)	(6.38)	(16)	(16)
Lambda					−0.14					−0.04
					(6.07)					(1.83)
Hausman test (*P*-value)				43					20	
				(0.0)					(0.0)	
T-statistics: first stage				22.0					21.0	
Partial R^2: first stage				0.018					0.018	
No. of observations	24,964	24,964	24,964	24,964	24,964	25,480	25,480	25,480	25,480	25,480
Adjusted R^2	0.13	0.20	0.65	0.14	0.14	0.09	0.14	0.59	0.08	0.08
F-statistic	932	518	13.05	138	135	607	350	10.20	73	72

with the exception of leverage and square of assets, remain practically identical to the OLS estimation. The only coefficient that significantly changes in the regression is the coefficient on *D*. This result supports the view that diversification appears to be correlated with unobserved firm characteristics.

B. Estimating the Probability to Diversify: Probit Estimation

In this section, we discuss the estimation of the probability of diversifying. The results of this estimation will be used in the instrumental variable estimation as well as in Heckman's self-selection model.

Firm-specific characteristics influence the decision of firms to diversify. Firms with low profitability in their current operations may diversify into other segments in search of more lucrative opportunities. To control for current and past profitability, we include *EBIT/SALES* and its lagged values. Firms with a high level of investment in current operations are less likely to diversify. We therefore include *CAPX/SALES* and its lagged values. We also control for firm size by including the log of total assets and its lagged values. We also include historical average values of the log of total assets, *EBIT/SALES*, and *CAPX/SALES*.

As discussed in Section IV, we identify two sets of instruments that predict the decision to diversify while leaving firm value unaffected. The first set of instruments consists of industry and time variables. We include the attractiveness of the industry to conglomerates proxied by *PNDIV* (the fraction of all firms in the industry that are conglomerates) and *PSDIV* (the fraction of industry sales accounted for by conglomerates). We capture time trends by including the number of merger/acquisition announcements in a given year (*MNUM*) and their annual value in billions of U.S. dollars (*MVOL*). We also include real growth rates of gross domestic product (*GDP*), its lagged value (*GDP1*), the number of contractionary months in the year (*CONTRAC*), and its lagged value (*CONTRAC1*). The second set of instruments are firm characteristics. We include the exchange listing and country of incorporation of the firm. Firms listed on major exchanges (*MAJOREX*) as well as firms incorporated outside the United States (*FOREIGN*) are more likely to engage in acquisition/divestiture programs. We control for the effect of liquidity by including *SNP* (a dummy variable equal to 1 if the firm is on the S&P industrial index and 0 otherwise).

The maximum likelihood estimates of the probit coefficients are reported in Table VI. As probit coefficients are difficult to interpret, the table also reports the marginal effects of the change in each explanatory variable calculated at its sample mean. Small firms (low average historical size) with an increase in assets in recent years are more likely to diversify. There is weak evidence that firms with low profitability (*EBIT/SALES*) and low investment (*CAPX/SALES*) in recent past years, but with high average historical profitability and investment, are more likely to diversify. The coefficients are not significant however. Firm-level characteristics are not highly significant in explaining the diversification decision.

Table VI

Probit Estimates for Diversifying Firms

The dependent variable takes the value 1 when the firm operates in multiple segments and 0 otherwise. The reported results are for a sample of single-segment firms and all diversifying firms included in the excess value regressions using sales multipliers. The value *EBIT/SALES* is the ratio of *EBIT* to sales, and *CAPX/SALES* is the ratio of capital expenditures to sales. The variables *A_TA*, *A_EBIT*, and *A_CAPX* are the historical average values of the log of TA, *EBIT/SALES*, and *CAPX/SALES*. The variable *PNDIV* is the fraction of all firms in the industry that are conglomerates, and *PSDIV* is the fraction of industry sales accounted for by conglomerates. The variable *MNUM* is the number of announced mergers/acquisitions in the year, while *MVOL* is the U.S. dollar value of these. *GDP* (*GDP1*) is the growth rate in real *GDP* (and its lagged value), while the variable *CONTRACTION* (*CONTRACTION1*) is the number of months in the year the economy was in a recession (and its lagged value). The variable *MAJOREX* is a dummy that takes the value 1 if the firm is listed on Nasdaq, NYSE, or AMEX, and 0 otherwise. The variable *FOREIGN* is a dummy that takes the value 1 if the firm is incorporated outside the United States and 0 otherwise. The variable *SNP* is a dummy that takes the value 1 when the firm is part of the S&P index and 0 otherwise.

	Coefficient	*T*-statistic	Marginal Effect
Constant	−3.47	−31.03	−0.21
Log of total assets	0.22	3.98	0.03
EBIT/SALES	−0.07	−0.50	−0.01
CAPX/SALES	0.03	0.29	0.00
Log of TA (1 lag)	−0.10	−1.19	−0.01
EBIT/SALES (1 lag)	−0.07	−0.48	−0.01
CAPX/SALES (1 lag)	−0.11	−0.80	−0.02
Log of TA (2 lag)	0.23	4.18	0.02
EBIT/SALES (2 lag)	−0.10	−1.02	−0.01
CAPX/SALES (2 lag)	−0.09	−0.87	−0.02
SNP	−0.19	−4.08	−0.03
PNDIV	0.02	15.85	0.003
PSDIV	0.001	1.45	0.0002
MVOL	−0.0001	−0.36	0.00
MNUM	0.11	3.69	0.01
GDP	−0.01	−1.26	−0.002
GDP1	0.004	0.36	0.001
CONTRACTION	−0.08	−0.80	−0.02
CONTRACTION1	−0.02	−0.24	−0.01
A_TA	−0.20	−6.15	−0.02
A_EBIT	0.10	1.35	0.01
A_CAPX	0.04	0.39	0.01
MAJOREX	0.16	6.02	0.02
FOREIGN	0.06	1.22	0.02
No. of observations			24,964
Maximized likelihood			−6,478
Likelihood index			0.08
% multisegment observations			8.13

Industry and time instruments significantly explain the probability of diversifying. The coefficient of *PNDIV* is positive and significant. The coefficient of *PSDIV* is positive though not significant at conventional levels. An

increase in the fraction of conglomerates in the industry, by 4 percent from its mean of 48.6 percent, increases the probability of operating in multiple segments by 1 percent. An increase in merger/acquisition activity leads to an increase in the probability of operating in multiple segments, that is, increases the probability of diversifying. An increase in the number of deals announced (*MNUM*) by 0.7 thousands, from its mean of 2.03 thousand, leads to an increase of 1 percent in the probability of multisegment operations. Macroeconomic conditions, however, do not significantly influence the probability to diversify with the coefficients of both *GDP* (*GDP1*) and *CONTRAC* (*CONTRAC1*) being insignificant. Firms listed on major exchanges are significantly more likely to diversify. The coefficient of *MAJOREX* is positive and significant as hypothesized. The coefficient of *SNP* is negative and significant. Firms in the S&P industrial or transportation index are less likely to diversify. Foreign firms are also more likely to diversify, though this effect is not significant.[15]

C. *Instrumental Variables Estimation*

We use the estimated probability of operating in multiple segments from the probit models as a generated instrument for the diversification status. In the first stage, we use all the exogenous variables along with the probability of diversifying as explanatory variables in the decision to diversify, that is, D.[16] In the second stage, we use the fitted value from the first stage as an instrument for D. The coefficient of the instrumented D, as reported in Table V, is 0.30 (0.19) with sales (asset) multipliers and is significant at the one percent (one percent) level.

To test for the existence of endogeneity, we use Hausman's test (see Hausman (1978)). The Hausman test is based on the difference between the OLS estimator (which is consistent and efficient under the null hypothesis of no endogeneity and inconsistent under the alternative) and the IV estimator (which is consistent under both but inefficient under the null). We can reject the null of no endogeneity at the one percent level for both sales and asset multipliers. Bound, Jaeger, and Baker (1995) show that when instruments are weakly correlated with the endogenous explanatory variable, then even a small correlation between the instruments and the error can seriously bias

[15] The probit model reported in Table VI was also estimated for the sample of firms included when asset multipliers were used to calculate excess values. These estimates were qualitatively similar and have not been reported in the paper. Though they have not been reported, the estimates were used to calculate the fitted probabilities and selectivity correction for the corresponding estimation of the instrumental variable model and the self-selection model using asset multipliers.

[16] This involves regressing D on the estimated probability of diversification as well as on all the exogenous variables in the excess value equation. We also estimated an alternative model, in which we included all independent variables including the instruments in the probit equation in lieu of the predicted probability of diversifying. This alternative model does not impose the nonlinear functional form of the probit. We found that the alternate specification was always dominated by the probit specification and, therefore, we report the probit results.

estimates and lead to a large inconsistency in the IV estimates. They suggest reporting partial R^2 and F-statistics on the instruments in the first-stage regression as useful guides. We find that the probability of diversifying is highly significant, with a t-statistic of 22 (referred to as T-stats: first stage) and a partial R^2 of 0.02.[17] This alleviates the concern that our estimation suffers from biases introduced by having weak instruments.

D. Self-selection Model

Last, we report the results of a two-stage estimation of the endogenous self-selection model. The estimated parameters of the OLS estimation of equation (4) are reported in Columns 6 and 11 of Table V. The estimated coefficient of D is 0.18 when using sales multipliers and is significant at the one percent level. The estimated coefficient is 0.01 when using asset multipliers and is not significant. The coefficient of λ, the self-selection parameter is -0.14 (-0.04) and is significant at the 1 percent (10 percent) level when using sales (asset) multipliers. The estimated coefficient of λ is negative, as expected, and significant. This indicates the prevalence of self-selection and suggests that characteristics that make firms choose to diversify are negatively correlated with firm value. Firms with a higher probability of diversifying also tend to be discounted.

In summary, there is significant evidence of endogeneity with both the instrumental variables and self-selection models. The multisegment discount turns positive under both methods and in three of the four cases, it is significant at the one percent level.[18]

V. Refocusing Firms

Evidence on the value destruction associated with multiple segment firms also comes from observed gains achieved by refocusing firms. Comment and Jarrell (1995), John and Ofek (1995), and Berger and Ofek (1996) all document gains achieved by refocusing firms. In this section, we follow the same empirical strategy detailed in the previous section and examine the firm's decision to refocus in a sample of single-segment firms and all refocusing firms. In this sample of firms, the estimated discount in the BO(95) model is 17 percent (13 percent) using sales (asset) multipliers. This discount drops to 13 percent (11 percent) with sales (asset) multipliers in the extended BO(95)

[17] The R^2 of the first stage regression without including the generated probability of diversification was 0.035 (0.028) and increases to 0.053 (0.04) when the generated probabilities are included in the regression with sales (asset) multipliers. The partial R^2 is the increase in R^2 by including the probability to diversify and is 0.018 (0.012).

[18] To test the robustness of our results, we run various specifications of our model. These specifications involve including *RND/SALES* to control for growth opportunities within the firm, including industry growth estimates and excluding lagged values of firm size, profitability, and investment. The inclusion/exclusion of variables leaves unchanged our initial results, indicating strong evidence of the endogeneity of the diversification decision. The sign, magnitude, and significance of the estimated discount/premium remain intact.

model as seen in columns 3 and 8 of Table VII. The estimated discount, in the two-way fixed effects model, increases marginally from 13 percent to 14 percent with sales multiples. It is unchanged at 11 percent when excess values are estimated using asset multipliers.

We find that we can better explain the decision to refocus in comparison to the decision to diversify. The likelihood ratio index (as seen in Table VIII) in the estimation of the probability to refocus is 0.21, in comparison to 0.079 for the probability to diversify. Firms with high historical average investments (average *CAPX/SALES*) and low recent investments are less likely to operate in multiple segments, that is, more likely to refocus. Firms with high historical average profitability and high recent profitability are less likely to operate in multiple segments or more likely to refocus. Firms with high historical average value of assets are more likely to operate in multiple segments. In summary, firm characteristics like profitability, investments, and firm size all significantly explain the decision to refocus that is in contrast to their inability to significantly explain the decision to diversify.

Besides, firm characteristics, industry characteristics, and time trends also significantly determine the probability to refocus. The coefficients of both *PNDIV* and *PSDIV* are significantly positive. An increase in the number of conglomerates, as well as an increase in the share of sales accounted for by conglomerates, leads to an increase in the probability of operating in multiple segments, that is, firms in industries that are attractive to conglomerates are less likely to refocus. Increase in merger activity, as captured by an increase in the number of mergers/acquisitions, leads to a decrease in the probability of operating in multiple segments, that is, an increase in the probability of refocusing. This is in contrast to the diversification results, where an increase in merger activity increased the probability of operating in multiple segments. Favorable merger/acquisition conditions prompt firms to both diversify and refocus.

Macroeconomic conditions significantly explain the refocusing decision. This is in contrast to the diversification decision, where the coefficients of *GDP* growth and *CONTRAC* were not significant. Firms are more likely to operate in multiple segments when in a recession. There is also evidence that high *GDP* growth rates increase the probability of operating in multiple segments. This suggests that extreme macroeconomic conditions reduce the probability of refocusing. This is only partially consistent with the evidence in Maksimovic and Phillips (2001), who document that asset reallocations are highest in expansions.

Aside from the significance of individual variables, a better fit of the probit model is also reflected in the significance of the fitted probabilities in the first stage of the two-stage least squares estimation. The probability of refocusing is highly significant with a t-statistic of 52 and a partial R^2 of 0.079.[19]

[19] Though this high significance may merely be a manifestation of a good instrument, it has to be interpreted carefully. If the instrument is very highly correlated with the endogenous variable, it may also be correlated with the error, making it an unfit instrument to control for endogeneity. The relatively low R^2 in the first-stage regression suggests this is not a problem in this case.

Table VII

Effect of Multiple-Segment Operations on Firm Value of Refocusing Firms

The sample consists of single-segment firms and all refocusing firms. The dependent variable is excess value, which is the ratio of firm value to its imputed value. The variable *D* is a dummy that takes the value 1 when the firm operates in multisegments and 0 otherwise. The value *EBIT/SALES* is the ratio of *EBIT* to sales, and *CAPX/SALES* is the ratio of capital expenditures to sales. The variable *SNP* is a dummy that takes the value of 1 when the firm is part of the S&P index and 0 otherwise, The variable *LEV* is the ratio of long-term debt to total assets, and *ASS2* is the square of the log of total assets. Columns 2 to 6 (7 to 11) report results when sales (asset) multipliers are used to calculate imputed value. Year dummies have been included for the estimation of the instrumental variable (IV) model as well as that of the self-selection model. Standard errors have been corrected for autocorrelation, and *T*-statistics are reported in parentheses below.

	Sales Multipliers					Asset Multipliers				
	OLS (BO)	OLS	Fixed Effects	IV	Self-selection	OLS (BO)	OLS	Fixed Effects	IV	Self-selection
Constant	−0.38	−0.76	−0.14	−0.68	−0.68	−0.17	−0.43	0.62	−0.31	−0.31
	(36)	(28)	(2.82)	(32)	(32)	(18)	(17)	(13)	(15)	(15)
D	−0.17	−0.13	−0.14	−0.21	−0.21	−0.13	−0.11	−0.11	−0.11	−0.10
	(17)	(14)	(9.20)	(9.60)	(10)	(14)	(12)	(7.05)	(4.51)	(4.48)
Log of total assets	0.05	0.59	0.35	0.53	0.53	0.01	0.39	0.01	0.22	0.22
	(22)	(36)	(17)	(41)	(41)	(7.23)	(28)	(0.69)	(18)	(18)
EBIT/SALES	1.14	0.66	0.37	0.40	0.40	1.00	0.76	0.67	0.59	0.59
	(43)	(19)	(13)	(12)	(12)	(46)	(27)	(28)	(15)	(16)
CAPX/SALES	0.32	0.10	0.18	0.17	0.17	0.04	−0.03	−0.03	−0.004	−0.004
	(15)	(3.43)	(7.46)	(6.64)	(6.64)	(2.44)	(1.30)	(1.24)	(0.21)	(0.20)
Log of TA (1 lag)		−0.24	−0.27	−0.24	−0.24		−0.14	−0.12	−0.04	−0.04
		(12)	(19)	(14)	(14)		(8.09)	(9.43)	(2.79)	(2.78)
EBIT/SALES (1 lag)		0.26	0.21	0.23	0.23		0.13	0.20	0.16	0.16
		(7.15)	(7.60)	(6.25)	(6.25)		(4.38)	(8.74)	(3.81)	(3.84)
CAPX/SALES (1 lag)		0.03	0.04	0.05	0.05		−0.07	−0.04	−0.03	−0.03
		(0.83)	(1.91)	(2.03)	(2.04)		(2.79)	(2.19)	(1.59)	(1.60)
Log of TA (2 lag)		−0.18	−0.12	−0.11	−0.12		−0.15	−0.10	−0.10	−0.10
		(15)	(13)	(11)	(11)		(15)	(12)	(11)	(11)
EBIT/SALES (2 lag)		0.12	0.12	0.09	0.10		−0.02	0.05	−0.01	−0.01
		(4.60)	(5.86)	(3.48)	(3.56)		(1.10)	(2.76)	(0.28)	(0.24)
CAPX/SALES (2 lag)		0.09	0.06	0.06	0.06		0.06	0.02	0.04	0.04
		(3.72)	(3.16)	(3.23)	(3.22)		(2.93)	(1.49)	(2.46)	(2.46)
SNP				0.25	0.25				0.28	0.29
				(29)	(29)				(35)	(35)
LEV		0.02	0.25	0.17	0.17		−0.04	0.15	0.09	0.08
		(1.43)	(12)	(13)	(12)		(2.58)	(7.59)	(7.23)	(7.05)
ASS2		−0.01	0.01	−0.01	−0.01		−0.01	0.01	−0.01	−0.01
		(12)	(3.48)	(21)	(21)		(−9.85)	(5.76)	(15)	(15)
Lambda					0.03					−0.01
					(2.44)					(0.48)
Hausman test (*P*-value)				3.20					0.08	
				(0.07)					(0.45)	
T-statistics: first stage				52					47	
Partial R^2: first stage				0.079					0.066	
No. of observations	27,995	27,995	27,995	27,995	27,995	28,161	28,161	28,161	28,161	28,161
Adjusted R^2	0.13	0.19	0.64	0.13	0.14	0.09	0.14	0.58	0.08	0.08
F-statistic	1064	557	13.00	142	142	732	383	10.30	77	77

Table VIII

Probit Estimates for Refocusing Firms

The dependent variable takes the value 1 when the firm operates in multiple segments and 0 otherwise. The reported results are for a sample of single-segment firms and all focusing firms included in the excess value regressions using sales multipliers. Columns 2 to 4 display the estimated coefficients, *t*-statistics, and marginal effects estimated at the mean values of the exogenous variables. The value *EBIT/SALES* is the ratio of *EBIT* to sales, and *CAPX/SALES* is the ratio of capital expenditures to sales. The variables *A_TA, A_EBIT*, and *A_CAPX* are the historical average value of log of *TA, EBIT/SALES*, and *CAPX/SALES*. The variable *PNDIV* is the fraction of all firms in the industry that are conglomerates, and *PSDIV* is the fraction of industry sales accounted for by conglomerates. The value *MNUM* is the number of announced mergers/acquisitions in the year, while *MVOL* is the U.S. dollar value of these. *GDP* (*GDP1*) is the growth rate in real GDP (and its lagged value), while *CONTRACTION* (*CONTRACTION1*) is the number of months in the year the economy was in a recession (and its lagged value). The variable *MAJOREX* is a dummy that takes the value 1 if the firm is listed in Nasdaq, NYSE, or AMEX, and 0 otherwise. The variable *FOREIGN* is a dummy that takes the value 1 if the firm is incorporated outside the United States and 0 otherwise. The variable *SNP* is a dummy variable, which takes the value 1 when the firm is part of the S&P index and 0 otherwise.

	Coefficient	*T*-statistics	Marginal Effect
Constant	−3.40	−35.21	−0.24
Log of Total Assets	−0.09	−1.53	0.00
EBIT/SALES	−0.28	−1.94	−0.07
CAPX/SALES	0.24	1.58	−0.02
Log of TA (1 lag)	−0.20	−2.29	−0.02
EBIT/SALES (1 lag)	0.05	0.29	−0.03
CAPX/SALES (1 lag)	0.85	4.77	0.01
Log of TA (2 lag)	0.11	1.88	−0.01
EBIT/SALES (2 lag)	−0.14	−1.07	−0.01
CAPX/SALES (2 lag)	0.88	5.20	−0.02
SNP	−0.06	−1.54	0.01
PNDIV	0.02	14.97	0.003
PSDIV	0.01	12.87	0.001
MVOL	0.0003	1.02	0.0002
MNUM	−0.21	−8.10	−0.04
GDP	0.04	4.62	0.01
GDP1	0.01	0.93	−0.001
CONTRACTION	0.32	3.90	0.10
CONTRACTION1	0.25	3.15	0.05
A_TA	0.43	11.56	0.07
A_EBIT	−0.52	−4.40	−0.07
A_CAPX	−3.68	−13.97	−0.11
MAJOREX	0.20	7.94	0.03
FOREIGN	−0.33	−5.64	−0.05
No. of observations			27,995
Maximized likelihood			−8381
Likelihood index			0.21
% of positive observations			12.60

The estimated discount increases from 13 percent to 21 percent with sales multipliers. The Hausman test rejects the null of no endogeneity at the 7 percent level. The results with asset multipliers are much weaker. There is no evidence of endogeneity and the estimated discount drops from 8 percent to 7 percent, though it is still significant.

Similar results are obtained when the self-selection model is estimated. The coefficient of λ, the selectivity correction, is positive as expected and is significant at the 5 percent level when using sales multipliers. The estimated discount increases to 21 percent. However, the coefficient λ is not significant when we use asset multipliers and the estimated discount stays roughly the same at 10 percent. In line with the results of the instrumental variable estimation, there exists evidence of self-selection only when sales multipliers are used. With sales multipliers there is evidence that, controlling for the endogeneity of the refocusing decision, there is an increase in the estimated discount associated with multisegment operations. Also, the coefficient of the estimated selectivity bias with sales multipliers is positive as hypothesized, that is, characteristics that make firms choose to refocus are positively correlated with excess value. This is in contrast to the results reported for diversifying firms, where λ was estimated with a significant negative coefficient.[20]

VI. Conclusion

Firms choose the extent of their operations and decide whether to operate in a single industry, diversify into multiple industries, or refocus their operations. A firm's choice to diversify is likely to be a response to exogenous changes in the firm's environment that also affect firm value. In this case, the observed correlation between diversification and firm value is not causal.

There are systematic patterns in diversification strategies and relative value of firms. Firms are more likely to move away from industries with relatively low growth and high exit rates. Firms that choose to diversify have higher value than exiting firms in their industry and lower value than other firms in the industry that remain focused.

We model the effect this endogeneity has on the observed correlation between diversification and firm value. We use panel data and instrumental variables to control for the exogenous characteristics that predict the decision to diversify. Once these observed firm characteristics and firm fixed effects are controlled for, the evidence in favor of the assertion that diversification destroys value is substantially weaker. When we jointly estimate the decision of a firm to diversify and its firm value, the diversification

[20] We estimate the variants of the basic model to check for the robustness of our results analogously to the robustness checks for the diversification decision. The estimated results including *RND/SALES*, including industry growth rates, and excluding lagged values of the explanatory variables, are qualitatively unchanged. These results are not reported and are available from the authors.

discount is more likely to be a premium. The evidence in this paper suggests that diversification is a value-enhancing strategy for those firms that actually pursue it.

We follow a similar strategy to evaluate the correlation between firm value and the decision to refocus. The results are similar for this case. Firms that refocus their operations would have suffered a significant decrease in value if they had remained diversified. This evidence suggests that the observed correlation between diversification status and firm value need not be causal, but rather the outcome of actions by profit-maximizing firms reacting to shocks in their environments.

Our results highlight the value of constructing more complete models of the interaction between firm strategies and firm value. The development of a dynamic model that will jointly allow for both diversification and focus by firms in response to changes in their economic environment and that could also be structurally estimated with the available data should be the long-run objective. Short of a full dynamic structural model, the evidence in this paper highlights the importance of identifying large exogenous shocks to firms to adequately evaluate the relationship between firm choices and equilibrium outcomes.

REFERENCES

Aron, Debra, 1988, Ability, moral hazard, firm size and diversification, *The Rand Journal of Economics* 19, 72–87.

Berger, Phillip, and Eli Ofek, 1995, Diversification's effect on firm value, *Journal of Financial Economics* 37, 39–65.

Berger, Phillip, and Eli Ofek, 1996, Bustup takeovers of value destroying diversified firms, *Journal of Finance* 51, 1175–1200.

Bodnar, Gordon, Charles Tang, and Joseph Weintrop, 1997, Both sides of corporate diversification: The value impacts of geographic and industrial diversification, Working paper 6224, NBER.

Bound, John, David Jaeger, and Regina Baker, 1995, Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak, *Journal of the American Statistical Association* 90, 443–450.

Chandler, Alfred, 1977, *The Visible Hand* (Belknap Press, Cambridge, MA).

Chevalier, Judith, 2000, Why do firms undertake diversifying mergers? An analysis of the investment policies of merging firms, Working paper, University of Chicago.

Comment, Robert, and Gregg Jarrell, 1995, Corporate focus and stock returns, *Journal of Financial Economics* 37, 67–87.

Denis, David, Diane Denis, and Atulya Sarin, 1997, Agency problems, equity ownership, and corporate diversification, *Journal of Finance* 52, 135–160.

Dixit, Avinash, and Robert Pindyck, 1994, *Investment under Uncertainty* (Princeton University Press, Princeton, NJ).

Fauver, Larry, Joel Houston, and Andy Naranjo, 1998, Capital market development, legal systems and the value of corporate diversification: A cross-country analysis, Working paper, University of Florida.

Fluck, Zsusanna, and Anthony Lynch, 1999, Why do firms merge and then divest? A theory of financial synergies, *Journal of Business* 72, 319–346.

Graham, John, Michael Lemmon, and Jack Wolf, 2002, Does corporate diversification destroy value? *Journal of Finance*, 57, 695–720.

Hadlock, Charles, Michael Ryngaert, and Shawn Thomas, 2001, Corporate structure and equity offerings: Are there benefits to diversification? *Journal of Business* 74, 613–635.

Harris, Milton, C. H. Kriebel, and Artur Raviv, 1982, Asymmetric information, incentives, and intrafirm resource allocation, *Management Science* 28, 604–620.

Hausman, Jerry, 1978, Specification tests in econometrics, *Econometrica* 46, 1251–1271.

Heckman, James, 1979, Sample selection bias as specification error, *Econometrica* 47, 153–161.

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

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

Jensen, Michael, 1988, Takeovers, their causes and consequences, *Journal of Economic Perspectives* 2, 21–48.

John, Kose, and Eli Ofek, 1995, Asset sales and increase in focus, *Journal of Financial Economics* 37, 105–126.

Khanna, Tarun, and Krishna Palepu, 2000, Is group affiliation profitable in emerging markets? An analysis of diversified Indian business groups, *Journal of Finance* 55, 867–891.

Lamont, Owen, 1997, Cash flow and investment: Evidence from internal capital markets, *Journal of Finance* 52, 83–110.

Lamont, Owen, and Christopher Polk, 2001, The diversification discount: Cash flows versus returns, *Journal of Finance*, 56, 1693–1721.

Lang, Larry, and René Stulz, 1994, Tobin's q, corporate diversification and firm performance, *Journal of Political Economy* 102, 1248–1280.

Lewellen, Wilbur, 1971, A pure financial rationale for the conglomerate merger, *Journal of Finance* 26, 521–537.

Lins, Karl, and Henri Servaes, 1998, Is corporate diversification beneficial in emerging markets?, Working paper, London Business School.

Lins, Karl, and Henri Servaes, 1999, International evidence on the value of corporate diversification, *Journal of Finance* 54, 2215–2239.

Maksimovic, Vojislav, and Gordon Phillips, 2001, The market for corporate assets: Who engages in mergers and asset sales and are there efficiency gains? *Journal of Finance* 56, 2019–2065.

Maksimovic, Vojislav, and Gordon Phillips, 2002, Do conglomerate firms allocate resources inefficiently across industries? *Journal of Finance*, 57, 721–767.

Matsusaka, John, 1993, Takeover motives during the conglomerate merger wave, *The Rand Journal of Economics* 24, 357–379.

Matsusaka, John, 2001, Corporate diversification, value maximization, and organizational capabilities, *Journal of Business* 74, 409–431.

Perold, Andre, 1999, Capital allocation in financial firms, Working paper, Harvard Business School.

Rajan, Raghuram, Henri Servaes, and Luigi Zingales, 2000, The cost of diversity: The diversification discount and inefficient investment, *Journal of Finance* 55, 35–80.

Rotemberg, Julio, and Garth Saloner, 1994, Benefits of narrow business strategies, *American Economic Review* 84, 1330–1349.

Scharfstein, David, 1998, The dark side of internal capital markets II: Evidence from diversified conglomerates, Working paper 6352, NBER.

Scharfstein, David, and Jeremy Stein, 2000, The dark side of internal capital markets: Divisional rent seeking and inefficient investment, *Journal of Finance* 55, 2537–2567.

Schoar, Antonette, 1999, Effects of corporate diversification on productivity, Working paper, University of Chicago.

Servaes, Henri, 1996, The value of diversification during the conglomerate merger wave, *Journal of Finance* 51, 1201–1225.

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

Stulz, René, 1990, Managerial discretion and optimal financial policies, *Journal of Financial Economics* 26, 3–27.

Villalonga, Belen, 2002, Does diversification cause the "diversification discount"? Working paper, Harvard Business School.

Wernerfelt, Birger, and Cynthia Montgomery, 1988, Tobin's q and the importance of focus in firm performance, *American Economic Review* 78, 246–250.

Weston, James, 1970, The nature and significance of conglomerate firms, *St. John Law Review* 44, 66–80.

Whited, Toni, 2001, Is it inefficient investment that causes the diversification discount? *Journal of Finance* 56, 1667–1691.

[Footnotes]

[1] **The Value of Diversification During the Conglomerate Merger Wave**

Henri Servaes

The Journal of Finance, Vol. 51, No. 4. (Sep., 1996), pp. 1201-1225.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28199609%2951%3A4%3C1201%3ATVODDT%3E2.0.CO%3B2-9

[1] **Takeover Motives during the Conglomerate Merger Wave**

John G. Matsusaka

The RAND Journal of Economics, Vol. 24, No. 3. (Autumn, 1993), pp. 357-379.

Stable URL:

http://links.jstor.org/sici?sici=0741-6261%28199323%2924%3A3%3C357%3ATMDTCM%3E2.0.CO%3B2-1

[1] **International Evidence on the Value of Corporate Diversification**

Karl Lins; Henri Servaes

The Journal of Finance, Vol. 54, No. 6. (Dec., 1999), pp. 2215-2239.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28199912%2954%3A6%3C2215%3AIEOTVO%3E2.0.CO%3B2-X

LINKED CITATIONS

[1] **Is Group Affiliation Profitable in Emerging Markets? An Analysis of Diversified Indian Business Groups**
Tarun Khanna; Krishna Palepu
The Journal of Finance, Vol. 55, No. 2. (Apr., 2000), pp. 867-891.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28200004%2955%3A2%3C867%3AIGAPIE%3E2.0.CO%3B2-8

[2] **Tobin's q, Corporate Diversification, and Firm Performance**
Larry H. P. Lang; René M. Stulz
The Journal of Political Economy, Vol. 102, No. 6. (Dec., 1994), pp. 1248-1280.
Stable URL:
http://links.jstor.org/sici?sici=0022-3808%28199412%29102%3A6%3C1248%3ATCDAFP%3E2.0.CO%3B2-J

[5] **Does Corporate Diversification Destroy Value?**
John R. Graham; Michael L. Lemmon; Jack G. Wolf
The Journal of Finance, Vol. 57, No. 2. (Apr., 2002), pp. 695-720.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28200204%2957%3A2%3C695%3ADCDDV%3E2.0.CO%3B2-G

References

Ability, Moral Hazard, Firm Size, and Diversification
Debra J. Aron
The RAND Journal of Economics, Vol. 19, No. 1. (Spring, 1988), pp. 72-87.
Stable URL:
http://links.jstor.org/sici?sici=0741-6261%28198821%2919%3A1%3C72%3AAMHFSA%3E2.0.CO%3B2-I

Bustup Takeovers of Value-Destroying Diversified Firms
Philip G. Berger; Eli Ofek
The Journal of Finance, Vol. 51, No. 4. (Sep., 1996), pp. 1175-1200.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199609%2951%3A4%3C1175%3ABTOVDF%3E2.0.CO%3B2-Y

LINKED CITATIONS

Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogeneous Explanatory Variable is Weak
John Bound; David A. Jaeger; Regina M. Baker
Journal of the American Statistical Association, Vol. 90, No. 430. (Jun., 1995), pp. 443-450.
Stable URL:
http://links.jstor.org/sici?sici=0162-1459%28199506%2990%3A430%3C443%3APWIVEW%3E2.0.CO%3B2-U

Agency Problems, Equity Ownership, and Corporate Diversification
David J. Denis; Diane K. Denis; Atulya Sarin
The Journal of Finance, Vol. 52, No. 1. (Mar., 1997), pp. 135-160.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199703%2952%3A1%3C135%3AAPEOAC%3E2.0.CO%3B2-8

Why Do Firms Merge and Then Divest? A Theory of Financial Synergy
Zsuzsanna Fluck; Anthony W. Lynch
The Journal of Business, Vol. 72, No. 3. (Jul., 1999), pp. 319-346.
Stable URL:
http://links.jstor.org/sici?sici=0021-9398%28199907%2972%3A3%3C319%3AWDFMAT%3E2.0.CO%3B2-S

Does Corporate Diversification Destroy Value?
John R. Graham; Michael L. Lemmon; Jack G. Wolf
The Journal of Finance, Vol. 57, No. 2. (Apr., 2002), pp. 695-720.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28200204%2957%3A2%3C695%3ADCDDV%3E2.0.CO%3B2-G

Corporate Structure and Equity Offerings: Are There Benefits to Diversification?
Charles J. Hadlock; Michael Ryngaert; Shawn Thomas
The Journal of Business, Vol. 74, No. 4. (Oct., 2001), pp. 613-635.
Stable URL:
http://links.jstor.org/sici?sici=0021-9398%28200110%2974%3A4%3C613%3ACSAEOA%3E2.0.CO%3B2-6

Asymmetric Information, Incentives and Intrafirm Resource Allocation
M. Harris; C. H. Kriebel; A. Raviv
Management Science, Vol. 28, No. 6. (Jun., 1982), pp. 604-620.
Stable URL:
http://links.jstor.org/sici?sici=0025-1909%28198206%2928%3A6%3C604%3AAIIAIR%3E2.0.CO%3B2-N

LINKED CITATIONS

Specification Tests in Econometrics
J. A. Hausman
Econometrica, Vol. 46, No. 6. (Nov., 1978), pp. 1251-1271.
Stable URL:
http://links.jstor.org/sici?sici=0012-9682%28197811%2946%3A6%3C1251%3ASTIE%3E2.0.CO%3B2-X

Sample Selection Bias as a Specification Error
James J. Heckman
Econometrica, Vol. 47, No. 1. (Jan., 1979), pp. 153-161.
Stable URL:
http://links.jstor.org/sici?sici=0012-9682%28197901%2947%3A1%3C153%3ASSBAAS%3E2.0.CO%3B2-J

Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers
Michael C. Jensen
The American Economic Review, Vol. 76, No. 2, Papers and Proceedings of the Ninety-Eighth Annual Meeting of the American Economic Association. (May, 1986), pp. 323-329.
Stable URL:
http://links.jstor.org/sici?sici=0002-8282%28198605%2976%3A2%3C323%3AACOFCF%3E2.0.CO%3B2-M

Takeovers: Their Causes and Consequences
Michael C. Jensen
The Journal of Economic Perspectives, Vol. 2, No. 1. (Winter, 1988), pp. 21-48.
Stable URL:
http://links.jstor.org/sici?sici=0895-3309%28198824%292%3A1%3C21%3ATTCAC%3E2.0.CO%3B2-N

Is Group Affiliation Profitable in Emerging Markets? An Analysis of Diversified Indian Business Groups
Tarun Khanna; Krishna Palepu
The Journal of Finance, Vol. 55, No. 2. (Apr., 2000), pp. 867-891.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28200004%2955%3A2%3C867%3AIGAPIE%3E2.0.CO%3B2-8

Cash Flow and Investment: Evidence from Internal Capital Markets
Owen Lamont
The Journal of Finance, Vol. 52, No. 1. (Mar., 1997), pp. 83-109.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199703%2952%3A1%3C83%3ACFAIEF%3E2.0.CO%3B2-U

LINKED CITATIONS

The Diversification Discount: Cash Flows versus Returns

Owen A. Lamont; Christopher Polk

The Journal of Finance, Vol. 56, No. 5. (Oct., 2001), pp. 1693-1721.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28200110%2956%3A5%3C1693%3ATDDCFV%3E2.0.CO%3B2-P

Tobin's q, Corporate Diversification, and Firm Performance

Larry H. P. Lang; René M. Stulz

The Journal of Political Economy, Vol. 102, No. 6. (Dec., 1994), pp. 1248-1280.

Stable URL:

http://links.jstor.org/sici?sici=0022-3808%28199412%29102%3A6%3C1248%3ATCDAFP%3E2.0.CO%3B2-J

A Pure Financial Rationale for the Conglomerate Merger

Wilbur G. Lewellen

The Journal of Finance, Vol. 26, No. 2, Papers and Proceedings of the Twenty-Ninth Annual Meeting of the American Finance Association Detroit, Michigan December 28-30, 1970. (May, 1971), pp. 521-537.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28197105%2926%3A2%3C521%3AAPFRFT%3E2.0.CO%3B2-0

International Evidence on the Value of Corporate Diversification

Karl Lins; Henri Servaes

The Journal of Finance, Vol. 54, No. 6. (Dec., 1999), pp. 2215-2239.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28199912%2954%3A6%3C2215%3AIEOTVO%3E2.0.CO%3B2-X

The Market for Corporate Assets: Who Engages in Mergers and Asset Sales and Are There Efficiency Gains?

Vojislav Maksimovic; Gordon Phillips

The Journal of Finance, Vol. 56, No. 6. (Dec., 2001), pp. 2019-2065.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28200112%2956%3A6%3C2019%3ATMFCAW%3E2.0.CO%3B2-E

LINKED CITATIONS

Do Conglomerate Firms Allocate Resources Inefficiently across Industries? Theory and Evidence

Vojislav Maksimovic; Gordon Phillips

The Journal of Finance, Vol. 57, No. 2. (Apr., 2002), pp. 721-767.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28200204%2957%3A2%3C721%3ADCFARI%3E2.0.CO%3B2-I

Takeover Motives during the Conglomerate Merger Wave

John G. Matsusaka

The RAND Journal of Economics, Vol. 24, No. 3. (Autumn, 1993), pp. 357-379.

Stable URL:

http://links.jstor.org/sici?sici=0741-6261%28199323%2924%3A3%3C357%3ATMDTCM%3E2.0.CO%3B2-1

Corporate Diversification, Value Maximization, and Organizational Capabilities

John G. Matsusaka

The Journal of Business, Vol. 74, No. 3. (Jul., 2001), pp. 409-431.

Stable URL:

http://links.jstor.org/sici?sici=0021-9398%28200107%2974%3A3%3C409%3ACDVMAO%3E2.0.CO%3B2-W

The Cost of Diversity: The Diversification Discount and Inefficient Investment

Raghuram Rajan; Henri Servaes; Luigi Zingales

The Journal of Finance, Vol. 55, No. 1. (Feb., 2000), pp. 35-80.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28200002%2955%3A1%3C35%3ATCODTD%3E2.0.CO%3B2-M

Benefits of Narrow Business Strategies

Julio J. Rotemberg; Garth Saloner

The American Economic Review, Vol. 84, No. 5. (Dec., 1994), pp. 1330-1349.

Stable URL:

http://links.jstor.org/sici?sici=0002-8282%28199412%2984%3A5%3C1330%3ABONBS%3E2.0.CO%3B2-G

The Dark Side of Internal Capital Markets: Divisional Rent-Seeking and Inefficient Investment

David S. Scharfstein; Jeremy C. Stein

The Journal of Finance, Vol. 55, No. 6. (Dec., 2000), pp. 2537-2564.

Stable URL:

http://links.jstor.org/sici?sici=0022-1082%28200012%2955%3A6%3C2537%3ATDSOIC%3E2.0.CO%3B2-2

LINKED CITATIONS

The Value of Diversification During the Conglomerate Merger Wave
Henri Servaes
The Journal of Finance, Vol. 51, No. 4. (Sep., 1996), pp. 1201-1225.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199609%2951%3A4%3C1201%3ATVODDT%3E2.0.CO%3B2-9

Internal Capital Markets and the Competition for Corporate Resources
Jeremy C. Stein
The Journal of Finance, Vol. 52, No. 1. (Mar., 1997), pp. 111-133.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28199703%2952%3A1%3C111%3AICMATC%3E2.0.CO%3B2-R

Tobin's q and the Importance of Focus in Firm Performance
Birger Wernerfelt; Cynthia A. Montgomery
The American Economic Review, Vol. 78, No. 1. (Mar., 1988), pp. 246-250.
Stable URL:
http://links.jstor.org/sici?sici=0002-8282%28198803%2978%3A1%3C246%3ATQATIO%3E2.0.CO%3B2-2

Is It Inefficient Investment That Causes the Diversification Discount?
Toni M. Whited
The Journal of Finance, Vol. 56, No. 5. (Oct., 2001), pp. 1667-1691.
Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28200110%2956%3A5%3C1667%3AIIIITC%3E2.0.CO%3B2-9