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International corporate diversification and performance: Does firm self-selection matter?

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Abstract
This paper presents new evidence on US multinational firms and shows that the decision to diversify internationally is endogenous, and depends on firm, industry, and home-country characteristics. US multinational firms are a self-selected sample, and firms that are more likely to diversify internationally have lower firm values. Contrary to the global diversification discount literature, multinational firms are valued at a premium after controlling for the endogeneity of the global diversification (foreign direct investment-FDI) decision. These results parallel the industrial diversification literature and underline the importance of controlling for endogeneity when examining the impact of international diversification on firm value.
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INTRODUCTION

Firms are increasingly diversifying across national borders, and many of the world's largest and most successful firms are multinationals. For instance, a company in the Dow Jones Industrial Average now derives, on average, about 40% of its revenue from outside the US.[1] Denis, Denis, and Yost (2002) find that the fraction of globally diversified firms has increased substantially in the US over the period from 1984 to 1997. This descriptive evidence leads us to question whether the benefits of international diversification outweigh the costs, and whether the performance impact of foreign direct investment (FDI) or global diversification is positive. Economists tend to look on diversification at the firm level with skepticism, since investors can achieve portfolio diversification benefits with lower costs.

Why do firms diversify? Does international diversification create or destroy value? Does the diversification premium (discount) arise from the firm's underlying characteristics, from international diversification itself, or both? Theoretically, international diversification can have positive as well as negative effects on firm value. Similarly, the underlying characteristics that drive the firm's decision to diversify also impact firm value. If firms *choose* to diversify internationally a proper evaluation of the impact of international diversification would be incomplete without considering the underlying characteristics that influence the decision to diversify. Failure to

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control for the underlying firm characteristics driving the firm's decision to diversify may wrongly attribute the impact on firm value to diversification rather than the underlying characteristics.

International business (IB) theory (transactions cost and internalization of market imperfections) suggests that multinational enterprises (MNEs) have to be successful firms at home in order to be able to compete in international markets. For example, firms that are successful in developing a highly differentiated product or proprietary assets in their home markets will choose to go abroad to expand their market and benefit from economies of scale (Caves, 1996). Firms investing abroad incur sunk costs for the set-up of production facilities that are higher than those of exporting firms, so only the most productive firms will invest abroad (Castellani & Zanfei, 2004).[2]

Alternatively, agency theory suggests that management's choice to diversify internationally could result in an international diversification discount: a poorly performing firm may decide to diversify internationally in order to avoid greater scrutiny by shareholders in its home markets, because monitoring managers internationally is difficult; and weak governance in host countries may facilitate value-destroying investments, resulting in lower firm values and a higher probability to diversify (Dastidar & Weiner, 2007). Cross-subsidization of poorly performing divisions (Berger & Ofek, 1995) or misalignment of incentives between the parent company and its international divisions could also decrease firm value. These negative factors are likely causes rather than effects of international diversification. If one does not account for these characteristics that drive the firm to diversify internationally, one would wrongly attribute the increase (decrease) in firm value to diversification rather than to the past performance of the firm. Even if firms that go abroad self-select, the relationship between international diversification and value may not be entirely endogenous.

There is a vast literature suggesting that international diversification itself may have specific advantages or disadvantages that go *beyond* the characteristics of the firm and the industry in which it operates (Dastidar & Weiner, 2007). MNEs may exploit differences in product and factor markets, international taxation, and financial markets that enable them to extract higher rents (Errunza & Senbet, 1981, 1984; Kogut, 1983) and compete successfully with local firms (Caves, 1996). However, multinationals also face a liability of foreignness, arising from cultural, political, and economic differences, and unfamiliarity of the environment (Hymer, 1976; Kindelberger, 1969; Zaheer, 1995). This suggests that MNEs face additional costs due to: higher cost of information in locations that are culturally and geographically distant (Hennart, 1991); transportation costs, trade barriers, modifications to adapt the product to local conditions (Usunier, 1996; Hennart, 2007); and increased management coordination across borders (Sundaram & Black, 1992).

I draw upon the industrial diversification literature, since the theoretical motivation for the diversification decision is similar whether the firm decides to diversify across borders (FDI) or across industries. With regard to the industrial diversification discount,[3] Campa and Kedia (2002) show that the discount drops and sometimes turns into a premium when one accounts for the endogeneity of the diversification decision. Graham, Lemmon, and Wolf (2002) show that the discount occurs because firms acquire already discounted business units, and Chevalier (2004) shows that cross-subsidization between divisions is apparent in the pairs of merging firms prior to their mergers. These results from the industrial diversification literature suggest that international diversification is very likely subject to the same endogeneity: that is, the valuation impact may not be a consequence of diversification *per se*, but may be caused by better- (worse-) performing firms expanding abroad. Prior research has not addressed the question of endogeneity for multinational diversification.

In order to provide a clean test of global diversification I focus on pure multinationals – that is, multinational firms that are internationally diversified but not industrially diversified – to avoid confounding the impact of international diversification with industrial diversification.[4] Pure multinationals are examined using a "chop-shop" approach (Lang & Stulz, 1994) that compares single-industry multinational firms against an international benchmark portfolio of single-industry firms from the countries where the multinational firm operates – that is, the multinational firm's natural competitors in product and capital markets.[5] This approach compares the multinational with the sum of its parts, and addresses the central question of the paper: Does international diversification create value? In addition, this paper seeks to untangle the effects on performance of firm characteristics from international diversification. The results also shed light on the drivers of

international diversification – that is, the traditional IB theories vs the agency cost explanation.

Consistent with some previous results, I document the existence of a global diversification premium of 5% in the US. After controlling for firm-specific factors that impact on firm value, diversified firms are valued no differently than their global benchmark portfolio. However, these regressions do not explicitly control for self-selection. I use the Heckman self-selection model to control for the endogeneity of the diversification decision (similar to the Campa & Kedia, 2002, industrial diversification choice model). The empirical evidence in this paper shows that less successful firms venture abroad to pursue growth, prestige, diversification of managerial risk, etc., so performance worsens with increased likelihood of international diversification, supporting the agency theory explanation of the underlying drivers of international diversification for US firms.[6]

In addition to the impact of self-selection, international diversification itself increases firm value. This suggests that self-selection effects counter the positive impact of international diversification, resulting in insignificant results in pooled regressions. These results are in line with the evidence from the industrial diversification literature (Campa & Kedia, 2002). These results highlight the importance of underlying firm characteristics, and suggest that international diversification itself may add value, but the firm's capabilities and managerial motives help determine the success or failure of the outcome.

The next section reviews some of the prior literature on diversification and multinational investment. This is followed by descriptions of the data and the methodology, an analysis the results, and a discussion of the results. The final section concludes.

WHY DO FIRMS DIVERSIFY INTERNATIONALLY? THEORY AND EVIDENCE

Some theoretical arguments both for and against international diversification are presented in this section, followed by a brief review of the empirical evidence.

Theory

Transactions cost and internalization theory suggests that the multinational firm exists only if it is able to raise its total profit by minimizing costs of production through economies of scale or higher productivity, or by internalizing market imperfections. MNEs also have a highly differentiated product (intangible assets) and large market share (Caves, 1971) in order to overcome the intrinsic advantage of the local competitors (Caves, 1996). Many multinationals first develop these advantages, or proprietary assets such as patents or trademarks, marketing and selling skills, innovations, etc., in some national market and then transfer them across borders. Over time the marginal returns to further expansion at home decline, and it becomes increasingly attractive for the firm to expand abroad, assuming that the MNE can transplant its local expertise to the global market. This implies that MNEs are likely to be large, successful, and highly profitable firms even prior to the first diversification decision: that is, MNEs are a self-selected sample.

The traditional IB theory discussed above argues that MNEs are likely to be large and successful firms. However, agency theory argues that managers may expand across borders for personal gain. Managers derive private benefits from diversification that exceeds their private costs (Denis, Denis, & Sarin, 1997). Managers may follow a strategy of "empire building" to increase power and prestige associated with managing a larger firm (Jensen, 1986; Stulz, 1990); to increase compensation (Jensen & Murphy, 1990); to diversify personal risk (Amihud and Lev, 1981); or to increase managerial entrenchment (Shleifer & Vishny, 1989). Multinationals are likely to be difficult to monitor if their operations are widely dispersed, thus reducing the effect of the market for corporate control. This suggests that MNEs are likely to be large, though not necessarily successful or profitable, even prior to the first diversification decision: that is, MNEs are a self-selected sample.

It is an empirical question whether the benefits outweigh the costs of international diversification. To draw any conclusions about the impact of international diversification on firm performance, however, one must disentangle the effects of diversification from the endogeneity of the diversification decision. Any examination of the relationship between firm value and international diversification, whether positive or negative, is incomplete without taking into account this self-selection (Campa & Kedia, 2002). As mentioned in their paper, the literature provides several theoretical models suggesting that the diversification decision is endogenous (Fluck & Lynch, 1999; Maksimovic & Phillips, 2002; Matsusaka, 2001; Perold, 1999).

Once the self-selection bias or the endogeneity of the diversification decision is taken into account, some firms may be able to overcome the costs and benefit from international diversification while others may not: that is, synergy arguments may outweigh agency cost arguments (see Berger & Ofek, 1995, and Campa & Kedia, 2002, for a detailed list). It is an empirical question whether MNEs create or destroy value.

Empirical Evidence

Several papers find that globally diversified firms trade at a discount that is similar in magnitude to that of the industrial diversification discount (Christophe, 1997; Christophe & Pfeiffer, 2002; Click & Harrison, 2000; Denis et al., 2002; Fauver, Houston, & Naranjo, 2004). Other papers find that find that multinationals trade at a premium (Bodnar, Tang, & Weintrop, 1997).[7] These papers do not examine the endogeneity of the diversification decision.[8]

The industrial diversification literature confirms that the impact of diversification on firm value is subject to self-selection. Campa and Kedia (2002) find that firms choose to diversify industrially, and the characteristics that make them diversify cause them to be discounted. Villalonga (2004) examines the industrial diversification discount using various econometric techniques to control for self-selection, and confirms that diversification does not destroy value. Hyland and Diltz (2002) also confirm these results using a sample of diversifying acquisitions. This study extends these results from the industrial diversification literature to multinational diversification.

DATA

Data on accounting items are obtained from Datastream, and geographic segment data are obtained from the Worldscope database, which is based on company reports. Since data on geographic segments are primarily available from 1990 onwards, the sample period from 1990 to 1998 is chosen to maximize the number of firms with international sales data. Data after 1998 are not included in the sample, to maintain consistency in the reporting of the segment data.[9] Further, the focus of this study is on pure multinationals, that is, single-segment by industry (defined by two-digit SIC code) and multi-segment by location of sales (defined by region). I use two-digit SIC codes because this combines industries that are closely related and require comparable management skills (Doukas & Kan, 2006; Servaes, 1996).[10]

Sales data for each firm year are broken down separately by product segment or geographic segment (maximum 10 segments).[11] Segment sales are used as a proxy for geographic or international diversification.[12] Firms in Australia, Canada, Hong Kong, Japan, New Zealand, Singapore, the UK, and the US are required to report sales by industry and geographic area. Since the firm-level data on geographic segments are not always precisely defined by country, it is necessary to divide the benchmark sample into broad regions. Without this restriction, multinational firms reporting segment sales in Europe would be considered less diversified than multinational firms reporting sales in Germany, France, and Italy. Such differences could be entirely spurious and generated solely by differences in reporting across firms. Therefore the geographic segments of the main sample are manually classified into five regions: local, Australasia, Europe, North America, and the Rest of the World (primarily includes emerging markets). A breakdown of the countries included in the five regions is provided in the Appendix. The data includes segment sales from 49 countries.[13]

The sample excludes private firms, firms with two-digit SIC codes 49 (utilities) and 60 to 69 (financial firms), firms where the sum of segment sales is less than 90% of total sales (Berger & Ofek, 1995; Lins & Servaes, 1999),[14] and firms where it is not possible to find a median benchmark for some segments – all of which is consistent with the literature.[15] In order to calculate the firm value measure, an additional restriction is imposed that there be at least five pure play local firms within a particular industry defined at the two-digit SIC code level. Firms without such a match are dropped from the sample to ensure that the imputed value of a particular segment is truly representative of that industry. Further, firms where the absolute difference between the actual value and the imputed value of the firm is greater than 4 are also removed (Bodnar et al., 1997; Fauver et al., 2004).

The sample is then divided into two subsamples: the multinational sample, including all *multinational* single-industry firms headquartered in the US; and the benchmark sample, including all *local* single-industry firms headquartered in developed and emerging markets. Firms are considered to be multinational or globally diversified if they have sales in one or more regions in addition to local sales. Firms are considered to be local if they do not

report geographic segment sales, and the percentage of foreign sales is less than 10% of total sales.

Table 1 describes the sample. According to Panel B, multinational firms sell primarily to the Rest of the World and then to Europe and Australasia. All of the accounting variables data are from Datastream and are considered to be common across countries and hence have maximum comparability across borders.[16] As expected, multinationals are larger than local firms based on market capitalization and sales. Leverage[17] is lower for multinational firms. Tobin's Q is the sum of the market value of equity plus the book value of debt plus current liabilities divided by total assets. Q is higher for local firms than for MNEs, which is consistent with Christophe (1997).

METHODOLOGY

The dependent variable, excess value, is calculated for both multinational single-segment firms and the benchmark single-segment local firms. Excess value for the multinational firm captures its value relative to the sum of its parts, and excess value for the single-segment firm captures its value relative to the median firm in that industry. Multinational conglomerates and domestic conglomerates are excluded from the sample in order to avoid confounding effects from industrial diversification.[18] If excess value for the MNE is positive (negative) it implies that the MNE is creating (destroying) value relative to its benchmark. I focus on excess value as a measure of firm performance because it reflects the present value of future cash flows, and does not require any risk adjustment, unlike stock returns and accounting measures (Lang & Stulz, 1994). An alternative measure of firm value would be Tobin's Q, but the number of observations with Q as the dependent variable is much smaller, and hence the majority of the analysis is done with market value to sales as the dependent variable.

Using a method similar to Berger and Ofek (1995):

$$\text{Excess value} = \log\left[\frac{V}{I(V)}\right]$$

where

$$I(V) = \sum_{j=1}^{5} Sales_j \times M(\cdot)$$

V is the total market capitalization of the firm, and $I(V)$ is the imputed value of the firm. Imputed value is the sum of the product of the sales of each segment ($Sales_j$) and a multiplier, $M(\cdot)$. The multiplier is computed as the median ratio of market capitalization to sales of single-segment local firms.[19] Another reason for using the market capital to sales ratio is that these numbers are least likely to be affected by differences in accounting regulations across countries.

This paper compares the multinational with the sum of its parts. The multinational is compared with a benchmark portfolio of firms. The imputed value or the benchmark portfolio value is calculated using an international portfolio, which includes both US and non-US firms. Similar excess value measures are reported in Fauver et al. (2004). For the international benchmark, the multiplier is computed as the median value of local firms from five regions – Local, Australasia, Europe, North America, and the Rest of the World. For example, if a multinational firm operates in the drug industry and has sales in the domestic market, Europe, and Australasia, its imputed value will be the sum of the sales-weighted median value of domestic firms operating in the drug industry in the home country (for segment 1), in the drug industry in Europe (for segment 2), and in the drug industry in Australasia (for segment 3). The international benchmark portfolio compares the value of a multinational firm with a sales-weighted international portfolio of single-segment pure plays. This implicitly assumes that the global investor is in a "relatively" integrated market with access to investment opportunities across the different countries.[20]

This is the relevant benchmark sample because the multinational firm competes with firms in the international sphere. Further, for a local investor seeking international diversification benefits, the alternative to an MNE is an international portfolio of single-segment firms. The international benchmark also addresses the central question of this paper: Do MNEs create value? It allows comparisons between an MNE and the sum of its parts. Assuming that the management's goal is shareholder wealth maximization, the firm should diversify only if the diversification decision adds value: that is, the MNE should be worth more than the sum of its parts, or else the management should leave the diversification to the shareholders. Comparing an MNE with a local, purely domestic firm would not capture this. Any differences in firm value between the MNE and its domestic counterpart could be due to underlying firm characteristics and have nothing to do with international diversification. The advantage of

Table 1 Sample description

Panel A Multinational firms

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Number of MNEs	59	194	233	256	276	297	502	554	609	2,980

Panel B Number of segments by region

Region	Domestic	Australasia	Europe	World	Total
Number of segments	5,437	1,808	3,572	3,616	14,433

Panel C Univariate statistics

Type of firm	*Market*			*Log of total assets*	*Q*	*% of foreign sales*	*Number of segments*	*Herfindahl index (sales)*
	Capitalization ($)	*Sales* ($)	*Leverage*					
Multinationals	2,518,309	1,700,376	0.19	12.54	2.04	31.51	2.56	0.69
Domestic	715,378	862,896	0.23	11.72	2.30			

Panel D Benchmark firms

Country	*Number of benchmark firms*	*Country*	*Number of benchmark firms*
Australia	441	Mexico	287
Austria	136	Morocco	1
Belgium	214	Netherlands	178
Brazil	55	New Zealand	98
Canada	662	Norway	374
Chile	363	Pakistan	138
China	142	Peru	66
Columbia	47	Philippines	278
Czech Republic	12	Poland	8
Denmark	387	Portugal	271
Egypt	4	Russia	33
Finland	89	Singapore	199
France	403	South Africa	835
Germany	383	Spain	264
Greece	257	Sweden	202
Hong Kong	127	Switzerland	187
India	454	Taiwan	875
Indonesia	541	Thailand	1,098
Ireland	65	Turkey	130
Israel	5	UK	1,685
Italy	66	US	11,514
Japan	5,274	Venezuela	31
Korea	1,300	Zimbabwe	3
Malaysia	1,427		
Total			31,609

This table describes the distribution of the sample across time, nationality, and industry. All data are from Worldscope and include firms operating in a single industry sector defined at the two-digit SIC code level. The total number of firm-years in the sample is divided into two subsamples. The sample in panel A includes multinational firms headquartered in the US. These firms are single segment by industry and multi-segment by country. Panel B describes the regions where the multinational operates. All sales are divided into five regions (domestic, Australasia, Europe, North America, and the Rest of the World). The Australasian sample includes domestic single-industry firms from Australia, Hong Kong, Japan, New Zealand, and Singapore; Europe includes Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, and the UK; North America includes Canada and the US; and the world includes Brazil, Chile, China, Columbia, Czech Republic, Egypt, Greece, India, Indonesia, Israel, Morocco, Mexico, Malaysia, Pakistan, Peru, Philippines, Poland, Portugal, Russia, South Africa, South Korea, Taiwan, Thailand, Turkey, Venezuela, and Zimbabwe. Panel C provides univariate statistics. Panel D includes single-segment firms that only operate domestically in a single industry. The analysis is based on two-digit SIC codes that are grouped together for presentation.

the local benchmark, of course, is that there are no accounting differences to worry about. However, it does not answer the question: Do MNEs create value? The local benchmark focuses on how MNEs are different from single-segment domestic firms.[21]

There are no confounding effects from industrially diversified firms because they are excluded from the sample. This method cannot be used to compare a multinational "conglomerate" firm with the sum of its parts, since this would require firms to provide data on sales revenues by region and then within each region by product segment. These data are currently unavailable.

The multinational sample includes firms that have operated in international markets for many years, in contrast to the Graham et al. (2002) paper, which examines the first diversification decision of the firm. The motivation for the multinational firm's first diversification decision may be vastly different from subsequent decisions, because firms learn from their mistakes and successes. Successful firms who have experience with international diversifications are more likely to be successful with future acquisitions. For example, Zaheer and Mosakowski (1997) find that liability of foreignness decreases with time. Lang and Stulz (1994) find that the discount matters for one- and two-segment firms but not for firms with larger numbers of segments, which is consistent with firms learning and gaining experience from diversification. Further, firms may enter and exit a particular country at different points in time. This will change the fraction of firms in the industry that are internationally diversified, which in turn causes variation in the excess value measure for the diversified firms (Campa & Kedia, 2002). It is important to understand and control for these firm-specific factors that impact on the diversification decision and how they change over time. Once firms have gained experience they should be better able to deal with the complexities of increased diversification.

Next, the possible factors affecting excess value are examined using two methods in a regression framework. First, pooled ordinary least squares (OLS) regressions across firm years are reported for comparison with prior literature. This assumes that each firm year is an independent observation, or that the *t*-statistics may be inflated by including multiple observations of the same firm. To deal with this problem, several papers present fixed effects regressions with a diversification dummy to capture the diversification discount. Fixed effects regressions are the equivalent of the regression of $y_{it}-\bar{y}_i$ on $\boldsymbol{x}_{it}-\bar{\boldsymbol{x}}_i$ where $\boldsymbol{x}$ is a vector of independent variables. Since the mean value of the diversification dummy is likely to be 1, the coefficient on the diversification dummy actually captures the impact of those firms in the sample that move across categories – that is, from diversified to non-diversified and vice versa. Hence dummies are difficult to interpret in a fixed-effects regression.[22]

Further, firm fixed effects assume that any firm characteristics affecting the firm's decision to diversify are constant. These firm characteristics are not individually specified in this methodology. Another disadvantage is that it cannot control for industry or macroeconomic variables that may affect the firm's decision to diversify but have no impact on firm value. The Heckman (1979) two-stage procedure, on the other hand, is not subject to these limitations. It estimates firm value while controlling for the endogeneity of the diversification decision.

The following discussion of the Heckman two-stage procedure in the context of multinational diversification is based on Campa and Kedia (2002).[23] This is a modified Heckman procedure, because firm value is available for firms that are diversified as well as for those that are not. The usual Heckman procedure does not work in this case.

OLS regressions in the diversification literature and pooled results presented in this paper have the following structure:

$$V_{it} = \delta_0 + \delta_1 X_{it} + \delta_2 D_{it} + e_{it} \qquad (1)$$

where V_{it} is the measure of excess value described above, X_{it} are various firm-specific characteristics, D_{it} is a dummy variable (D) that takes the value 1 if the firm is diversified and 0 otherwise, and e_{it} is an error term. If, however, underlying firm characteristics make firms choose to diversify, the dummy variable (D_{it}) will be correlated with the error term, resulting in a biased estimate of δ_2. For example, the firm's decision could be influenced by its past performance in terms of investment, profitability, return on assets (ROA), and size; by industry characteristics, such as the number of internationally diversified firms; and by macroeconomic factors, such as GDP growth. If firms choose to diversify based on underlying characteristics they are not a random sample but a self-selected sample. The Heckman two-stage procedure takes this into account. I use a panel data extension of the Heckman's selection model.[24]

In the first-stage probit model the dependent variable is a dummy variable (D_{it}) that takes the value 1 if the firm is globally diversified and 0 otherwise. This is regressed on various firm-specific and industry-specific characteristics that could affect the firm's decision to diversify, and the firm-level means of these characteristics[25] (Z_{it}) plus an error term u_{it}.

$$D_{it}^{*} = \beta Z_{it} + \mu_{it} \quad (2)$$

The first stage of the Heckman procedure yields a propensity score or the *predicted* value of the decision to diversify. This is used to obtain estimates of the self-selection correction, or lambda, which corresponds to the inverse mills ratio described in the Greene textbook.[26]

The second-stage regression is similar to the OLS regression of excess value on various firm-specific variables (**X**) and the firm's diversification (D_{it}), with the exception that it also includes the correction for endogeneity (λ).Without this correction, the usual regression model would compare MNEs with domestic firms under the assumption that the MNEs constitute a random sample of all firms in the database. Intuitively, λ accounts for the differences in firm value arising from the firm, industry and home-country characteristics that drive a particular firm to choose to diversify internationally. A positive coefficient on λ implies an upward bias in the estimated effect of international diversification without the self-selection correction. This suggests that the characteristics driving international diversification are positively correlated with performance, so successful domestic firms are more likely to venture abroad, and performance improves with the increased likelihood of international diversification. In contrast, the agency cost view of international diversification implies a negative coefficient on λ or a downward bias: less successful firms venture abroad to pursue growth, prestige, diversification of managerial risk, etc., so performance worsens with increased likelihood of international diversification. The coefficient on the diversification variable D_{it} (δ_2) shows the impact of diversification on firm value after correcting for self-selection, that is, the net effect. If δ_2 is significant it implies that international diversification has benefits or costs that go beyond the underlying characteristics of the firm.

RESULTS

This section applies the previously discussed methodologies to a sample of firms from the US. First, I examine whether firms are valued at a premium/discount relative to their international benchmark. Then I examine the endogeneity of the firm's choice to diversify internationally.

Documenting the Impact of Diversification on Multinational Firm Value

Does global diversification create or destroy value for shareholders? MNEs are valued at a premium relative to an international benchmark portfolio (median value equals 5% and is significantly different from the local benchmark firm, based on a two-tailed Wilcoxon signed rank test), indicating that they are worth more than the sum of their parts – that is, MNEs create value. In comparison with previous studies, Denis et al. (2002) find an excess value loss from diversification of 5.4% based on an industrial benchmark[27] and Fauver et al. (2004) find an excess value loss of 6% using an international benchmark. In both papers, results are pooled across several years, and the differences are probably the result of this pooling as well as the benchmark. To allow comparison, I recalculate excess value over the period from 1991 to 1995, as in Fauver et al. (2004): there is an excess value loss from diversification of 4% in the US using an international benchmark, suggesting that the differences are due to the different sample periods.[28]

The impact of international diversification on firm value is examined in Tables 2 and 3. The dependent variable is the excess value measure based on the international benchmark. Since investors do have access to international markets, it is more appropriate to use the international benchmark rather than the local one, which assumes that investors are in a segmented market. Table 2 presents pooled OLS results and the second stage of the Heckman procedure after adjusting for the endogeneity of the diversification decision. The Heckman results are discussed in the next section. Relative size[29] and leverage are included to control[30] for changes in excess value that could be due to changes in capital structure or size of the firm.[31] Leverage also controls for the degree of financial slack available, that is, whether the firm is capital constrained. Relative profit margin is included to control for possible determinants of excess value (Denis et al., 2002). All the multivariate regressions use the excess value measure as the dependent variable.

Based on pooled results, diversification has an insignificant impact on excess value for the international benchmark. Annual regressions, not

Table 2 Effect of diversification for multinational firms

Panel A Annual excess values of multinational firms (international benchmark)

Full sample	1990	1991	1992	1993	1994	1995	1996	1997	1998
0.05*	0.02	0.03	−0.05	−0.04	−0.10*	−0.06*	0.09	0.11*	0.19*

Panel B Regression results

	Pooled (1990–1998)	*Heckman 2nd stage (1990–1998)*	*Heckman 2nd stage (1999–2005)*
Intercept	0.484	−0.099	−0.193
	(0.00)	(0.02)	(0.00)
Diversification	−0.008	0.388	1.909
	(0.73)	(0.00)	(0.00)
Relative leverage	−1.284	−1.668	−0.592
	(0.00)	(0.00)	(0.00)
Relative size	0.062	0.061	0.044
	(0.00)	(0.00)	(0.00)
Relative profit margin	−0.003	−0.008	−0.326
	(0.00)	(0.00)	(0.00)
λ		−0.222	−0.801
		(0.00)	(0.00)
Time dummies		Yes	Yes
N	8,534	8,056	38,038

Panel A presents median excess values for the full sample and for each year. Panel B presents the regression results. The dependent variable is the excess value measure based on the international benchmark. This is regressed on: a diversification dummy, which equals 1 if the firm is internationally diversified and 0 otherwise; leverage (ratio of total debt to total assets); size (log of total assets); and profit margin (profits after tax to total sales). Relative values of the independent variables are the difference between the actual value and the sales-weighted benchmark values for each segment that the firm operates in. Data for the explanatory variables are from Datastream. The accounting variables are considered to be common across countries and hence have maximum comparability across borders according to Datastream. Pooled regressions are OLS regressions where each firm year is treated as an independent observation. The last column presents the second stage of the Heckman procedure, where λ is the Heckman correction for endogeneity. p-values are reported in parentheses.

reported in this paper, were also analyzed. The number of observations drops, and the coefficient on the diversification dummy is generally insignificant, sometimes negative, except in 1997 and 1998, when it turns positive. The control variables maintain sign and significance across the different regressions. Relative leverage is consistently negatively related to excess value across all the regressions. This is consistent with prior literature (Denis et al., 2002). Most MNEs are likely to be much larger than the average local firm (Caves, 1971) so that they can effectively compete against the local firms that have the home country advantage. Therefore one would expect larger MNEs to be more competitive in international markets and hence have a higher excess value. Relative size is positively and significantly related to excess value, suggesting that economies of scale may result in higher profits for MNEs (Caves, 1971). Ideally we would like to examine how ownership structure affects the decision to diversify and the value of diversification, but the analysis is complicated owing to the presence of multiple endogenous relationships. Himmelberg, Hubbard, and Palia (1999) show that managerial ownership is also subject to an endogeneity problem similar to the diversification discount. Managerial ownership is related to observable and unobservable firm characteristics, which also affect firm value. Thus managerial ownership is an endogenous choice and not an independent variable.

To summarize, after controlling for firm-specific factors, globally diversified firms are valued the same as a focused firm: that is, MNEs do not destroy value. Further, a higher degree of diversification (percentage of foreign sales) results in a premium (results not reported). The results in this paper contradict the global discount literature (Christophe, 1997; Christophe & Pfeiffer, 2002; Click & Harrison, 2000; Denis et al., 2002; Fauver et al., 2004), which could be due to the benchmark used. To allow comparison with previous studies, I run the regression using the domestic/industry benchmark (results not reported). Consistent with previous results, diversification has a negative and significant impact on excess value for the domestic benchmark. As explained in the Methodology section, the comparison of multinationals with

Table 3 Endogeneity of the diversification decision

	1990–1998	*1999–2005*
Size	0.006	0.005
	(0.29)	(0.88)
Leverage	0.016	0.013
	(0.69)	(0.95)
CAPX/Sales	−0.008	−0.046
	(0.94)	(0.91)
EBIT/Sales	0.007	−0.089
	(0.14)	(0.01)
ROA	−0.084	0.005
	(0.00)	(0.01)
PNDIV	1.466	66.475
	(0.00)	(0.40)
GDP growth (3 years)	0.015	−0.779
	(0.36)	(0.91)
Time dummies	Yes	Yes
Fixed effects	Yes	Yes
Pseudo *R*-squared	0.08	0.09

This table presents the first stage of the Heckman procedure to correct for endogeneity. The table provides the marginal effects from the probit regression – the first stage of the Heckman procedure to correct for self-selection bias. A diversification dummy is regressed on various firm-specific and industry-specific characteristics. PNDIV is the fraction of all firms in the industry that are globally diversified. Data for the explanatory variables are from Datastream. The accounting variables are considered to be common across countries and hence have maximum comparability across borders according to Datastream. p-values are reported in parentheses.

their domestic industry counterparts does not help answer the question: Do multinationals create value?

The next section presents results for the Heckman two-stage procedure, which specifically controls for firm, industry, and home-country characteristics that may influence the firm's decision to diversify internationally.

The Endogeneity of the Diversification Decision

Table 3 presents probit results from the Heckman two-stage procedure. This first stage is a probit regression, which is used to obtain estimates of lambda (λ), the correction for endogeneity. As explained in the Methology section, the probit model assumes that the firm's decision to diversify is associated with various firm, industry, and country characteristics. In this model, a diversification dummy is regressed on lagged values of firm-specific and industry-specific characteristics:

- size (log of assets) of the firm, since multinational firms have to be large in order to overcome the advantages of domestic competitors (Caves, 1971);
- leverage (total debt to total assets) to control for the firm's capital structure, since diversified firms are likely to have easier access to lower cost of capital (Caves, 1971);
- investment or (CAPX/Sales), since firms with high levels of current investment are less likely to diversify (Campa & Kedia, 2002);
- profitability (profits after tax to total sales), since firms with low current profitability are more likely to diversify to seek lucrative opportunities (Campa & Kedia, 2002);
- ROA, since successful firms are more likely to diversify;
- the fraction of all firms in the industry that are globally diversified to control for industry effects in the diversification decision (PNDIV);
- and home country GDP growth over the past three years, because MNE growth rates are correlated with growth rates of their home economies (Aliber, 1993; Caves, 1996; Buckley, Dunning, & Pearce, 1978; Rowthorn & Hymer, 1971) and national growth patterns matter for major long-run variations in foreign investment (Caves, 1996).[32]

I also use time dummies to control for macroeconomic factors such as merger waves, recession or expansion, market bubbles, etc. As explained in the Methodology section, firm-level means of the variables are included to control for fixed effects. Inclusion of ownership variables such as bank/financial ownership and corporate block ownership does not impact on the results.

The pseudo-R-squared from the probit regression is 8% as compared with 14% in the Campa and Kedia (2002) sample. This difference is due partly to the lack of data on variables such as volume of mergers and acquisitions, firms listed on the major exchanges, etc.[33]

The remainder of this section is a comparative analysis of the Heckman procedure with the pooled OLS results from Table 2. First, we examine the results on the endogeneity of the diversification decision. The coefficient on lambda (λ), the correction for self-selection, is negative and significant, which is consistent with Campa and Kedia (2002). Endogeneity matters for multinational firms, and a higher probability of diversifying internationally implies lower excess values. This also implies that the OLS regression estimate of the impact of diversification (δ_2) is downward biased. The results in this paper parallel those in the literature. Denis et al. (2002) find a global diversification discount. Results from the product diversification literature

show a negative and significant relationship between the self-selection correction (λ) and firm value. The empirical evidence in this paper shows that less successful firms venture abroad to pursue growth, prestige, diversification of managerial risk, etc., so performance worsens with increased likelihood of international diversification.[34]

How does the impact of diversification on excess value change after controlling for the endogeneity of the diversification decision? After controlling for the factors that induce self-selection, there is an international diversification premium, suggesting that the benefits of international diversification outweigh the costs for US multinationals. The results are consistent with the findings on the industrial diversification discount by Campa and Kedia (2002).

Let us examine the impact of multinational diversification after controlling for the self-selection bias. It appears that multinationals are able to expand their market, benefit from economies of scale, develop the proprietary assets, consolidate their competitive advantage, etc. An alternative explanation could be that MNEs are very good either at taking over the best firms or at starting up the best plants. Criscuolo and Martin (2004) examine differences in productivity between foreign-owned plants and domestic-owned plants for a UK sample. They confirm that foreign-owned plants have higher productivity than domestic plants. But they also find an additional productivity advantage for US MNEs relative to other foreign-owned plants in the UK. MNEs can indirectly provide benefits of international portfolio diversification, resulting in higher firm values (Errunza & Senbet, 1981, 1984). Overall, the evidence emphasizes the importance of controlling for endogeneity when examining the relationship between international diversification and firm value.[35] The time period 1999–2005 was added, to see whether the results hold under new disclosure requirements. The sign and significance of the results do not change, though the magnitude of the bias and the diversification premium increases.

CONCLUSION

After addressing the methodological limitations observed in the literature, this paper finds that MNEs do not destroy value, and are valued just like focused firms. There is also evidence of endogeneity in the diversification decision. Multinational firms self-select, and MNEs with a higher probability of diversifying have lower excess values. These results are consistent with the literature on the industrial diversification discount for US firms – that is, a strong negative correlation between the probability to diversify industrially and excess value (Campa & Kedia, 2002). The US market is large and well diversified, offering ample opportunities for domestic expansion to successful firms and investors, so firms that diversify internationally are not rewarded by investors. Thus the impact of pure multinational diversification is positive but downward biased, owing to the endogeneity of the international diversification decision.

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NOTES

[1]The average multinational firm in my sample earns about 41% of its sales revenues from international sources.

[2]Doms and Jensen (1998) find that foreign-owned plants in the US have higher productivity (11–13% higher) than domestic plants.

[3]Lang and Stulz (1994); Berger and Ofek (1995); and Lins and Servaes (1999).

[4]According to Graham et al. (2002), benchmarks for valuing conglomerate firms should be carefully chosen, and the interpretation of conglomerate valuations that rely on comparisons with stand alone firms should be done cautiously.

[5]The advantage of the international benchmark is that it allows comparisons between an MNE and the sum of its parts. See the Methodology section for a more detailed description of the international benchmark.

[6]Dastidar and Weiner (2007) find a similar negative self-selection impact on firm performance for multinational conglomerates.

[7]Bodnar et al. (2003) show that the Denis et al. (2002) results can be replicated by including small firms in the sample and changing the measurement of the control variables. They suggest that the inclusion of small firms could be a problem, because they are less likely to be multinational and more likely to affect the valuation of the benchmark firm. This could increase the difference between the multinational firm and its imputed value, resulting in a globalization discount.

[8]Denis et al. (2002) suggest the use of firm fixed effects to try to control for endogeneity. Firm fixed effects controls for unobserved firm-level heterogeneity, whereas the Heckman two-stage procedure explicitly captures the impact of firm-specific characteristics as well as industry and macroeconomic influences on the firm's decision to diversify.

[9]After 1998, rule no. 14 of FASB was replaced by rule no. 131, where segments do not necessarily reflect industrial or geographic segments.

[10]A finer classification would reduce the number of firms in a particular industry, making it difficult to calculate imputed values.

[11]If the company reports more than 10 segments, the additional segment data are summarized and added to segment 10. While this may be somewhat arbitrary on the part of Worldscope, the data provided by firms are also somewhat inconsistent because there are no rules defining the scope of each segment – that is, firms report data by country or by region.

[12]Though the multinational is defined in terms of segment "sales", these segment sales represent international operations. According to Worldscope, geographic segment sales represent production facilities or subsidiaries of companies abroad. It also includes export sales when they cannot be subtracted out. This is a small fraction of the total data, according to Worldscope. Regardless of whether the segments represent greenfield investments, acquisitions, or export sales operations, the theoretical advantages or disadvantages of international diversification still apply. For example, the multinational firm can benefit from a lower cost of capital, exploitation of proprietary assets, and economies of scale. Hence these advantages or disadvantages arising from multinational expansion should be reflected in firm value.

[13]Based on the list of developed and emerging markets provided by the International Finance Corporation (IFC). Two countries are dropped owing to lack of data.

[14]If segment sales do not add up to total sales of the firm it creates an artificial difference between the actual and the imputed value of the firm.

[15]Accounting data on Datastream and Worldscope are primarily consolidated data. However, the segment data are not consolidated. Consequently, the sum of the segment sales data can be greater than the firm's total sales. To address this issue, firms where the sum of segment sales are greater than total segment sales have been excluded from the sample. Since the results do not change materially, all the tables are based on the entire sample including consolidated and non-consolidated accounting data.

[16]The word "common" refers to the adjustments that Datastream makes to the accounting data to account for differences in treatment across countries. I cannot comment on how accurate these adjustments are, but I do acknowledge that there are accounting differences across countries, and using Datastream's adjusted accounting numbers is an attempt to address this problem.

[17]Leverage is the ratio of total debt to total assets. Leverage ratios in this paper are comparable to those of Rajan and Zingales (1995).

[18]Dastidar and Weiner (2007) examine the interaction between industrial and geographic diversification for multinational conglomerates. The paper compares multinationals and multinational conglomerates to a local benchmark using a different methodology, which does not ignore geographic diversification.

[19]This ratio is used since segment-level assets and EBIT data are limited for non-US firms. Further, alternative ratios yield similar results in Berger and Ofek (1995) and Bodnar et al. (1997).

[20]Full integration would imply that the global investor could choose a median benchmark firm from anywhere in the world operating within the same industry. However, full integration is not assumed. This paper assumes that the median firm from an emerging market region, for example, is different from a median firm in Europe. An analysis of the median multiplier values from each region shows that they do differ from region to region. For example, the median multiplier value for manufacturing firms (SIC: 20–29) is 0.88 for Australasia, 1.17 for Europe, 0.54 for North America, and 0.69 for purely domestic US firms. Overall there are no consistent patterns in the multiplier values across the regions.

[21]Results for the local benchmark are available though not reported. Papers using the local benchmark include Berger and Ofek (1995), Bodnar et al. (1997), Lins and Servaes (1999), and Denis et al. (2002).

[22]Fama and French (2000) suggest that panel data regressions ignore the cross-correlation problem and the bias in the standard errors of the regression slopes caused by the residuals being correlated across the years. They suggest the use of Fama–Macbeth regressions to address this problem. The number of years in my sample is just 9 and hence makes it difficult to apply Fama–Macbeth *t*-statistics.

[23]Villalonga (2004) and Campa and Kedia (2002) have run exhaustive tests on alternative statistical techniques to capture endogeneity or self-selection in industrial diversification. All the methodologies find similar results. Hence I apply one of the generally

accepted techniques to examine the problem of self-selection.

[24]The Hausman test compares the estimates from fixed and random effects to test whether e_{it} is correlated with the regressors. The results of the test suggest that the fixed effects model is preferred, and that there is unobserved firm heterogeneity correlated with e_{it}. To control for this I include firm-level means of the variables in Z_{it}, as suggested by Woolridge (2002).

[25]Including the firm-level means controls for unobserved firm heterogeneity correlated with e_{it}, which is confirmed by the Hausman test. The difference between the fixed and random effects estimators does disappear.

[26]*Econometric Analysis* by William H. Greene, p. 952.

[27]The difference could be attributed to the different methodologies, samples, and the databases used in the two papers.

[28]They do not combine international sales into regions, which could also account for the differences in the numbers.

[29]All relative measures are the actual value minus a sales-weighted median industry and regional imputed value. Relative size, for example, captures the deviation of the firm's actual size from that of the sales-weighted portfolio of multiplier firms that form the basis for the excess value measure. Since MNEs are likely to be much larger than the local firm, an absolute measure of size would not sufficiently control for this effect. Similar relative control variables are used in Bodnar et al. (1997), Denis et al. (2002) and Fauver et al. (2004).

[30]Correlations between the explanatory variables are low in general.

[31]All the control variables used in the regression analysis are ratios that are considered to be common across countries and hence have maximum comparability across borders, according to Datastream.

[32]One could also include an additional industry control variable, the fraction of sales by MNEs in the industry (Campa & Kedia, 2002), but this is highly correlated with the number of multi-segment firms and is hence not included.

[33]While many of the firm-specific variables are not significant, these results are comparable to the probit results presented in Campa and Kedia (2002). Similar to their paper, industry factors matter more in influencing the diversification decision of the firm.

[34]As an additional test I compare geographically diversified firms and industrially diversified firms (multinationals and multinational conglomerates) against a domestic benchmark. The results confirm the self-selection bias (significant and negative): that is,the underlying characteristics associated with a greater likelihood of international diversification are associated with lower firm value. As mentioned earlier, industry multiplier values do not exhibit consistent patterns across regions, which could indicate the presence of a regional self-selection bias. However, domestic multipliers yield similar results, suggesting that the differences in regional multipliers cancel out on average.

[35]I also run the Heckman two-stage regressions using the domestic benchmark excess value measure and Tobin's Q. The sign and significance of the variables do not change with Tobin's Q. For the domestic benchmark the net effect of the impact of diversification after controlling for self-selection is insignificant.

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APPENDIX

See Tables A1 and A2.

Table A1 Breakdown of geographic segments by region

Region	*Countries*
Australasia	Australia, Hong Kong, Japan, New Zealand, and Singapore
Europe	Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, and the UK
North America	Canada and the US
Rest of the world	Brazil, Chile, China, Columbia, Czech Republic, Egypt, Greece, India, Indonesia, Israel, Morocco, Mexico, Malaysia, Pakistan, Peru, Philippines, Poland, Portugal, Russia, South Africa, South Korea, Taiwan, Thailand, Turkey, Venezuela, and Zimbabwe

Table A2 IFC list of developed and emerging markets[a]

Developed	Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, the UK, and the US.[b]
Emerging markets	Brazil, Chile, China, Columbia, Czech Republic, Egypt, Greece, India, Indonesia, Israel, Morocco, Mexico, Malaysia, Pakistan, Peru, Philippines, Poland, Portugal, Russia, South Africa, South Korea, Taiwan, Thailand, Turkey, Venezuela, and Zimbabwe

[a]The developed markets are manually classified into the European region, Australasia, and the North American region, while the emerging markets are classified as the Rest of the World.
[b]Iceland, Kuwait, and Luxembourg were excluded from the sample owing to a lack of data.

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