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How Much Does Corporate Effect matter? Definition and Estimation of Business-Variant Corporate Effect

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Abstract

This paper argues that previous variance decomposition studies analyzing the extent to which industry, corporate, or business effects explain business performance fail to account for uneven impact of corporate decision on subsidiaries, then systematically underestimating corporate effects. To better account for the impact of corporate decisions, we assume that depending on specific characteristics of a business unit compared to its sister businesses, the likelihood to receive above (or below) average resources will differ, thus affecting its performance. We find that business-variant corporate effects significantly matter. Furthermore, the explanatory power of our model in explaining business performance increases by 27.8% in absolute terms and around 55% in relative terms when introducing business-variant corporate effects.

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ABSTRACT

This paper argues that previous variance decomposition studies analyzing the extent to which industry, corporate, or business effects explain business performance fail to account for uneven impact of corporate decision on subsidiaries, then systematically underestimating corporate effects. To better account for the impact of corporate decisions, we assume that depending on specific characteristics of a business unit compared to its sister businesses, the likelihood to receive above (or below) average resources will differ, thus affecting its performance. We find that business-variant corporate effects significantly matter. Furthermore, the explanatory power of our model in explaining business performance increases by 27.8% in absolute terms and around 55% in relative terms when introducing business-variant corporate effects.

Keywords:

Corporate-level strategy; business-variant corporate effect, resource allocation

INTRODUCTION

The objective of corporate strategy is to make the corporate whole add up to more than the sum of its business units by deciding which businesses the corporation should be in and how managing the array of business units (Porter, 1987: 59). If mainstream strategy and major textbooks (e.g. Ansoff, 1965) emphasize the role of corporate strategy as a major determinant of the success of a firm, recent literature has questioned the relative influence of corporate decisions on the profitability of their subsidiary businesses (e.g., Rumelt, 1991).

On the fringes of the debates on the relative importance of industry vs business effects as a source of persistent performance differences among businesses (Schmalensee, 1985; Rumelt, 1991; McGahan and Porter, 1997, 1998, 2002, 2005), the small impact of corporate strategy found in models has generated a new debate among scholars (Brush and Bromiley, 1997; Bowman and Helfat, 2001, Adner and Helfat, 2003, Hough, 2006; Misangyi, Greckhamer, & Lepine, 2006). Although they all recognize a significant impact of corporate strategy as a source of performance differences, the discussion centers on the magnitude of corporate effects compared to other effects, and in particular compared to business effects. In their literature review, Bowman and Helfat (2001) report very different estimates of corporate effects: from negligible (e.g. Schmalensee, 1985; Rumelt, 1991), to a relatively high level (e.g. around 20% in Roquebert, Phillips, & Westfall, 1996 and in McGahan and Porter, 1998).

Authors who contend that corporate effects are underestimated give arguments related mainly to methodological problems. Most common explanations lie in sample selection issues (e.g. Bowman and Helfat, 2001) or in problems of collinearity between variables (Hough, 2006;

Misangyi et al., 2006). But a more convincing criticism refers to the limits of variance decomposition methods, which can only capture categorical effects (Adner and Helfat, 2003).

Following this argument, we emphasize the inability of standard variance decomposition techniques to account for business-variant corporate effects. Headquarters make decisions that will benefit some businesses more than others and sometimes at the expense of others. In other words, we argue that the evaluation of the impact of the overall corporate effects on business performance is the combination of business-invariant effect (the even impact on all subsidiaries' performance) and a business-variant effect (unevenly affecting subsidiaries' performance). Because variance decomposition methods only capture the average of the returns to the divisions in the corporation (Bowman and Helfat, 2001), it proves unable to account for business-variant corporate effects and therefore significantly undermine the overall corporate effects.

To examine whether and to which extent business-variant corporate effects matter, we consider two simple criteria that may affect the likelihood of a specific business attracting corporate resources more than its sister businesses: the relative market attractiveness and the relative size of the business unit in the corporate portfolio. Then, building on standard variance decomposition models testing industry, business and business-invariant corporate effects, we develop a complementary test by considering the impact of the two criteria on business performance.

The rest of the paper is organized as follows. We first explain how corporate strategy may unevenly affect subsidiary businesses' performance, and why variance component methods cannot capture business-variant corporate effect. Then, we estimate the impact of two resource

allocation criteria on business profitability. Finally we compare our results with previous studies to discuss the value of corporate effects.

BUSINESS-INVARIANT AND BUSINESS-VARIANT CORPORATE EFFECT

Corporate strategy literature emphasizes the role of headquarters' decisions in helping businesses achieve higher performance than if playing independently. Corporate decisions consist of allocating resources between business units to create more value than businesses would do independently or any other parent company would do (Grant, 2012). Value creation may result from synergies across businesses by facilitating the transfer of skills among the sister businesses (e.g. Porter, 1987: 59), the leveraging of resources such as finance, brand, knowledge and networks (e.g. Rumelt, 1974; Markides and Williamson, 1994, Adner and Helfat, 2003), or the optimization of the organizational structure of the corporation (Chandler, 1991; Williamson, 1975: 26-30).

Although the overall goal is to play a positive-sum game, headquarters' decisions may not impact all businesses similarly. They generally induce the redeployment of resources across business units. Some businesses will end-up with higher level of resources such as investment capacity, related patents, experienced top managers, others will suffer resource restrictions. Whether positive or negative, this re-allocation process may affect the return of all businesses, but not necessarily evenly.

The portfolio planning literature emphasizes the competitive position and the product-market attractiveness (Haspeslagh 1982, Hambrick, MacMillan, & Day, 1982), and the fit between a business unit and its parent company (Goold, Campbell, & Alexander, 1994) are the

main criteria that allocate resources across divisions. The literature on internal capital market goes in the same directions suggesting that resources are redeployed towards more efficient investments (Stein, 1997). However, more recent literature focuses more on anomalies of internal resource reallocation between businesses (Scharfstein and Stein, 2000; Stein, 2003). In particular, agency arguments suggest that inefficient allocations across divisions result from conflicting objective between the CEO and business units' managers (Meyer, Milgrom, & Roberts, 1992; Scharfstein and Stein, 2000) or from information asymmetries between business units and corporate managers (Harris and Raviv, 1996, 1998; Bernardo, Cai, & Luo, 2004). Another line of research (Bardolet, Fox, & Lovallo, 2011; Bardolet, Lovallo, & Rumelt, 2012) show that more than agency problems, inefficient allocations are essentially due to naïve diversification (Benartzi & Thaler, 2001), a cognitive bias favouring both equal resource allocation between all business units regardless of the quality of the investment and a systematic tendency towards reallocation of capital from large business units to small ones.

To analyze the influence of business-variant corporate effects on business unit performance, we consider both market attractiveness and the relative size of a business units as specific characteristics of a business unit that influence its likelihood to be allocated more or less resources than the average portfolio in the corporation.

More precisely, we test whether complementing standard estimation of industry, business and business invariant corporate effects by the relation between the attractiveness of its product market and the relative size of a business and its performance increase the value of the overall corporate effect.

VARIANCE DECOMPOSITION AND CORPORATE EFFECT

We rely on standard variance decompositions of business-level (Adner and Helfat, 2003):

$$r_{ij t} = \mu + \alpha_i + \beta_j + \gamma_t + \delta_{it} + \phi_{ij} + \varepsilon_{ij t} \quad (1)$$

Where, $r_{ij t}$ stands for the performance of a business in a particular industry i in year t belonging to corporation j . The α_i are industry effects, the β_j are business-invariant corporate effects, the γ_t are year effects, the δ_{it} are industry-year interaction effects, the ϕ_{ij} are business segment effects (specific to corporation-industry pairs), and the $\varepsilon_{ij t}$ are random errors.

Variance decomposition studies have mainly used components-of-variance (COV), nested ANOVA (OLS hierarchical regression), and hierarchical linear modeling (HLM).¹ Components-of-variance technique (COV), used in the seminal work by Schmalensee (1985), assumes that the effects of different factors are random in nature and therefore uncorrelated with the independent variable. However, subsequent studies show that there may be significant interdependencies between factors. For example, McGahan and Porter (1997) show an important and significant relation between industry and corporate effects. Furthermore, COV results prove highly dependent on the composition of the dataset: different tests on the same population can end up with a totally different estimation of the importance of the different factors (Brush and Bromiley, 1997)². Unlike COV, Hierarchical OLS regressions (nested ANOVA), does not assume random effects. Nested ANOVA calculates fixed effects, i.e. the business performance

¹ The studies by Brush, Bromiley, & Hendricks (1999) and Ruefli and Wiggins (2003) use different methods. The former use a two-stage least squares model (2SLS) and the latter uses a non-parametric, ordinal variable approach. Because neither of these approaches was re-used in later studies, we do not discuss their relevance.

² For more information about COV and other parametric approaches to decomposing variance to its components see the methodological literature such as Searle, Casella, & McCullach (2006: 391).

average of the categories in each factor. However, each factor's full vector of dummy variables is imported into the model sequentially and the increase in the R^2 or adjusted R^2 is imputed to the explanation power of the last factor imported to the model. Thus, not only does the sequence of introduction of industry and corporate dummy variables matter³, but also one can easily see the inherent collinearity between corporate and business dummy variables due to the fact that different businesses are nested inside corporations. Studies prior to Rumelt (1991) did not consider this problem since they were measuring market shares as a proxy for business effect (Schmalensee, 1985; Kessides, 1987, 1990; Montgomery and Wernerfelt, 1988).⁴ Rumelt (1991) recognized this problem and suggested that a substantial part of the effect ascribed to the corporate level may be associated with the business-level effect. Thus, Rumelt (1991) was reluctant to attribute a strong effect (more than 10 percent) to corporate-parent.

To avoid the problems of collinearity between corporations and industries and also between corporations and businesses, recent studies have experimented Hierarchical Linear Modeling (HLM) using the maximum likelihood (as opposed to the nested ANOVA, which uses multiple regressions). This method applies an iterative estimation of all effects simultaneously (Hough, 2006; Misangyi et al., 2006). In addition, the studies utilizing the HLM technique do not need to introduce dummy variables, thus providing a higher statistical power compared to nested ANOVA models (see Goldstein, 2011: 922).

By using average returns, variance decomposition methods only take the impact of the average of the returns to all of the businesses within a corporation to estimate corporate effect.

³ This problem occurs due to the cross-nesting reason, the fact that businesses are simultaneously nested in the both corporations and industries. The studies which use ANOVA usually estimate a range of effects for each of these two factors depending on the two possibilities of the order of integration of their dummies into the model (e.g., McGahan and Porter, 1997).

⁴ Importing the smaller grid dummy variable which is nested in a higher-level that proves greater, one may capture in the first variable all of the variance which could be associated with the higher-level factor.

(Bowman and Helfat, 2001) Basically, variance decomposition estimations rely on the difference between within-group and between-group variances: higher (lower) between-groups and lower (higher) within-groups variances for a factor result in estimating a higher (lower) value for that factor's effect. This is not problematic for factors such as business, industry or year effects. For instance, let's assume that we have a dataset with two years of observations comprising a high within-group variance of performance in each year and a low variance of performance between these two years. Then, estimations will find low year effects.

Applying the same method for estimating corporate effects is problematic. Suppose that corporate headquarters intentionally make a decision, such as rotating a successful top manager from a less strategic business to a more strategic one. This decision may induce higher within-corporate variance s relative to between-corporate variance. As a consequence, corporate effects happen to be underestimated.

Notice that although, HLM does not rely on dummy variables and also sorts the problems related to the collinearity of factors out, it suffers the same problem as other variance decomposition techniques about the estimation of corporate effect.

SAMPLE SELECTION

Replicating previous works, we use the Compustat database. Our sample set includes the 9-year period from 2001 to 2009, representing an economic cycle in North America: growth in the early 2000s followed by recession in the in the later 2000s. Industries are identified based on the SIC system at the 4- digit level. Prior studies aggregated the data related to business-

segments' size and profit at industry level. However, aiming to detect the details of the contribution of corporate headquarters to the performance of subsidiaries, we decided not to aggregate the business-segments at industry level. Therefore, contrary to previous studies, the corporation in our sample may possess more than one business-segment in a single industry.

We mainly follow McGahan and Porter (1997) in the data screening process. We excluded the industries that do not have data related to all of the years of the study time frame. We excluded the business segments having assets less than \$10 million. Also, we excluded the businesses that are active in depository segments (SIC codes starting with 60). We excluded businesses with missing data between the years whose related data were reported⁵. Following Bowman and Helfat (2001) suggestion, we also excluded single-business corporations. Bowman and Helfat (2001) suggest that including single-business corporations in the sample statistically underestimates the corporate parent effect. Moreover, the impact of the criteria that affect corporate resource allocation decisions, resulting in business-variant corporate effect, can be studied only in corporations with more than one subsidiary business.

The final sample contains 12645 observations for 3536 business segments possessed to 946 corporations, across 278 industry classifications.

METHODS

We use nested ANOVA to examine different effects on business performance and extend this by including business-variant corporate effect regressors. ANOVA proves more effective

⁵ For this condition, conservatively, we excluded the observations related to the whole corporation. As we intended to study within-corporation dynamics, excluding only the business might lead to having biased data especially if some of the big subsidiaries of the corporations excluded in this way.

than other variance decomposition methods because our newly proposed variables in the model, the attractiveness difference and the interaction term, were constructed with fixed effects.

Starting with the model designed by Adner and Helfat (2003) as described by equation 1, we introduce the relative market attractiveness and the relative size of the business units as the regressors characterizing subsidiaries. Furthermore, we consider the combination of both criteria as a determinant of resource allocation decisions. While the market opportunities of a business may have ambivalent influences on the corporate decisions, one can expect that the relative size of a business will significantly affect the ability of the corporation to allocate the required amount of resources to seize investment opportunities.

In other words, the smaller the relative size of a relatively attractive business, the higher the ability of the corporation to allocate the required level of investment.

$$r_{ijt} = \mu + \alpha_i + \beta_j + \gamma_t + \delta_{it} + \text{smallness}_{ijt} + \text{attract_dif}_{ijt} + \text{attract_dif}_{ijt} * \text{smallness}_{ijt} + \phi_{ij} + \varepsilon_{ijt} \quad (2)$$

Where, on top of fixed effects α_i , β_j , γ_t and δ_{it} , already described above, smallness_{ijt} and attract_dif_{ijt} respectively describe the size of the focal business unit relative to the corporate size and the difference between the attractiveness of a business unit and the average of the market attractiveness of all businesses in the corporate portfolio. smallness_{ijt} and attract_dif_{ijt} and the interaction term are introduced to the model right before the vector of business dummy variables to account for business-variant corporate effects.

Variables

Dependent variable

Profitability. In order to facilitate comparison with prior studies, we use the accounting values of return on assets (ROA) as the dependent variable. A small number of studies operationalized the performance by value-based measures such as market-to-book value and economic profit. These supported the robustness of the results to the dependent variable (e.g. Hawawini, Subramanian, & Verdin, 2003).

Independent variables

Relative smallness: Relative smallness, smallness, is measured as the inverse of the relative size of a business-segment to of the whole corporation.

The relative smallness of a business-segment to the whole corporation provides a sense of ability of the corporate parent for particular support of that business-segment resulting in a particular above-average contribution to performance of that business-segment.

$$\text{Smallness}_{ijt} = \sum_{jt} \text{size} / \text{size}_{ijt}$$

Smallness may receive any value greater than one.

Attractiveness difference: The objective is to measure the relative attractiveness of a business industry compared to other industries where the company is active in. The allocation of the non-scale free resources seems to be a function of the relative attractiveness of the subsidiaries, i.e. attractiveness difference, rather than their absolute attractiveness. Industry fixed effects provide us with information about their attractiveness, i.e. profitability over the whole time frame of the study. In addition, the industry-year fixed effects capture the variations of the industries' profitability each year beyond the industry fixed effects. Attractiveness difference is

measured as the difference between the attractiveness of the industry in which a business unit is active and the average of the whole portfolio of its corporate parent. Therefore the first step is to measure attractiveness as the aggregation of the industry fixed effect in year t and the industry fixed effects in t+1

$$\text{attract}_{ijt} = \text{fixed_industry}_i + \text{fixed_ind-year}_{i(t+1)}$$

Then, attractiveness difference (attract_dif) is measured for each subsidiary compared to the average of attract of its corporation:

$$\text{attract_dif}_{ijt} = \text{attract}_{ijt} - \sum_j \text{attract} / n$$

Where, n is the number of business segments the corporation j is active in.

Control variables

Control variables are the year, industry, corporation and business-segment⁶ full vectors of dummy variables considered as a base line of the model to compare our results with previous models.

The definitions of the variables are summarized in Table 1.

Insert Table 1 about here

⁶ Business segment dummy variables are present as control variables only in the two final regression models.

RESULTS

First we ran a Nested ANOVA model on our data to see whether our data are significantly different from the ones employed in previous studies (Table2). The dummy variables were added in the sequence of year, industry, corporation, and business segment. It is worth mentioning that as the transient effect of industry, the industry-year effect, turned out to be insignificant, we did not enter industry-year dummy variables into the model.

Insert Table 2 about here

As shown in table 2, the estimated effects by the general model (equation 1) in the present paper are close to those in previous studies.

Small differences between estimated effects in previous studies generally arise from sample differences (time frame, studied sectors, data cleaning procedures) and from the methods (McGahan and Porter, 2002; Bowman and Helfat, 2001).

The descriptive statistics and pairwise correlations for the variables used in the regression test are presented in Table 3.

Insert Table 3 about here

The results of the regression tests are provided in table 4. The first model presents the effects of year, industry, and corporation fixed effects as control variables of our latter models. The second, third, and fourth models test the effect of relative characteristics of business-segments on their performance. Model 5 is composed of the business-segment dummy variables in addition to the dummy variables in model 1.

It is worth noticing that the results of Model 5 are referred to as the “basic model of the study” in the first column of table 2. Finally, in the sixth regression model we add the business segment dummy variables to model 4. The comparison of the last two models enables us to show the explanatory power improvement of our model, Model 6, relative to the most comprehensive model used in previous literature, Model 5.

Model 2 does not show any significant contribution of corporate parents to the performance of the subsidiary businesses related to the relative size of them.

Model 3 shows the direct effects of the attractiveness-difference of subsidiaries on the contribution they receive from corporate level strategies and decisions on their performance. The results support that there is neither positive nor negative contribution of corporate level strategies to the performance of subsidiary businesses related to the relative attractiveness of their markets. According to model 3, one can easily conclude that enjoying relatively higher market opportunities does not induce business-variant corporate effect. The most important result, which supports our argument, is in model 4. We estimate the effects of the interaction term between parent’s intention and ability on business-variant corporate effect. Model 4 strictly confirms that the contribution of corporate level strategies to performance is a function of the interaction between attractiveness difference and relative smallness. The relative smallness of a business is taken as a proxy for the ability of the corporation to support that business segment. While, the

relative future attractiveness of the industry a business is active in predicts the intention of the corporate parent to provide above-average support.

Model 4 also shows relatively weak support of the theories which suggest that relatively bigger subsidiaries receive above-average attention by headquarters' managers. However, this result is neither supported by the Model 2 nor Model 6.

Comparing the results of model 4 with model 1, we observe that business-variant corporate effect really matters (8.8% increase in explanatory power). The results show that the business-variant corporate effect has an explanatory power almost comparable with corporate fixed effect, i.e. business-invariant corporate effect.

The comparison between Models 5 and 6 provides us with an estimate of the improvement of our model's explanatory power. Model 5 reproduces the basic model used in previous studies, reporting fixed effects only. Model 6 extends Model 4 by including business segment fixed effects. Model 6 differs from Model 5 by including the variables that may predict the rationale behind the corporate level resource allocation decisions, i.e. our proposed dependant variables. The results show a dramatic increase in the explanatory power of the comprehensive model (27.8% in absolute terms and around 55% in relative terms).

Insert Table 4 about here

Some patterns emerging from the results are worth mentioning.

First, the results we receive after adding the business fixed effects in Model 6 support the results obtained in previous one (Models 2 through 4). The only exception is the relatively weak significance of the coefficient of relative smallness in Model 4.

Moreover, the business-variant corporate effect was shown to be captured by the interaction between the attractiveness difference and the relative smallness. The positive effect of the interaction term is well supported by both Models 4 and 6.

In addition, our proposed model shows a significant improvement in explanatory power for both corporate and business segment effects. Running a nested ANOVA model by introducing year, industry, business-invariant corporate effect, business-variant corporate effect and business segment sequentially, we end up having the explained variance percentage of performance for each factor as presented in table5. We reiterate that we do not include the industry-year fixed effect in our table as it reveals insignificant. Table 5 compares the explanatory power of each effect and of the whole model with the ones of the basic model which was presented in table2.

Insert Table 5 about here

Business-variant corporate effect, explains 8.8% of performance variance. Comparing business-variant corporate effect with the well-known corporate fixed effect, i.e., business-invariant corporate effect, (23.1%), supports our main theoretical argument that business-variant corporate effect significantly matters. In other words, our results support that not only corporate

parents contribute to the performance of their subsidiaries when, on average, their subsidiaries make different profits, but also, they specifically contribute to the performance of their subsidiaries based on characteristics that are both internal and external to the corporation. We sum these two effects and estimate the total corporate effect on business level performance as 31.9%, which is highly comparable with business level effect.

Notice that the whole proposed model also has a dramatically higher explanatory power than the basic ANOVA model (27.8% absolute and around 55% relative increase in explanatory power). To our knowledge, none of the previous studies has provided such a level of explanatory power.

Finally, we checked the robustness of the results in several ways. First, as it is evident in table 4, measuring the effects by R^2 instead of adjusted R^2 provides us with the same conclusions. In addition, we imported the industry-year dummy variables to all of the regression models in spite of their insignificance. As we expected, we observed relatively similar increase in R^2 and decrease in adjusted R^2 of all of the models and ended up having the same conclusions as in our main study. Also, we tested our regression models for a more limited time frame, 2003-2009, and we obtained the same results. Moreover, our results were shown to be robust, although less significant, when we aggregated the data related to size and profit for the business segments at industry level.

Finally, in order to control for the possibility that the increase in the explanatory power of our model is due to random improvement or to computational effects, we ran an extra robustness test. We randomly changed the values of the independent variables in the model through the observations, and ran the regression model for 100 iterations. The results show that the averages of both R-squared and adjusted R-squared found in the 100 regression iterations were not

significantly different from the basic standard variance decomposition model. While both R-squared and adjusted R-squared of our model were significantly different, and indeed higher, than the averages of the results of the iterations. This confirms that our model provides a better explanation of the determinants of business segments' performance.

DISCUSSION

The objective of this paper is to show that the standard variance decomposition techniques, which are based on categorical estimations, are limited when evaluating corporate effects. The results show that corporate effects are systematically underestimated because corporations' resource allocation decisions may increase the "within" portfolio variance of businesses' performance, and because corporations' resource allocation rationale cannot be captured by standard variance decomposition methods.

We tried to model the effect of this rationale, or above-average attention of the headquarters to one or some of its subsidiary businesses, on the businesses' performance. We introduced the notion of business-variant corporate effect and claimed that it reveals the rationale behind corporate headquarters' decisions about resource reallocation among their subsidiaries. Our results show that when considering business specific characteristics that influence resource allocation decisions, we obtain a better (and a significantly higher) estimation of corporate effects.

However, whether this business-variant effect is really a corporate effect remains to be discussed. Given that it may be different for each subsidiary of a corporation, one could argue that it should be considered as a business effect. We argue that the so-called business-variant corporate effect, which is a zero-sum effect among each corporate portfolio, is a corporate effect

because both of its constructs, smallness and attractiveness, are defined in relation to the corporate portfolio. In other words, the estimation of the effect is not sensitive to business-only related characteristics.

Assume that two corporations A and B both have one subsidiary with exactly the same characteristics (size, profit, etc.) and playing in the same industry. However assume that corporation A's subsidiary is the least attractive of the portfolio while that of corporate B is the most attractive of its corporate's portfolio. Then, following our argumentation, while corporate B would subsidize its business unit, corporate A would rather transfer resource from the business unit to other more attractive sister businesses. As a consequence, changes in the performance of those two subsidiaries are directly and exclusively explained by corporate level decisions.

We can discuss similarly about the smallness variable. Assume that the A's subsidiary, also, is the most attractive of the portfolio. Moreover, assume that corporation A is ten times bigger than corporation B. Then, however both corporations tend to allocate resources to the focal subsidiary businesses, the focal businesses have different chances for receiving extra support from their parents. Again, we see that the changes in the performance of those two subsidiaries are directly and exclusively explained by corporate-related characteristics.

We also can support our argument statistically. We regressed the business-variant corporate effect, i.e. the interaction term, against the business fixed-effects in three ways; first, without aggregating business segments at industry level, then by aggregating at 3- and 4-digit industry SIC codes. The results show that the coefficient of the business fixed-effects is overwhelmingly significantly negative. This result suggests two comments. First, because there is no positive correlation, it is easy to conclude that the interaction term does not deal with business fixed effect. Second, it complies with the findings of the literature on internal capital

allocation that emphasizes principal-agent conflicts between headquarters and business units. This literature suggests that less successful subsidiaries are more likely to show rent-seeking behaviors and absorb headquarters' attention and corporate level resources (Stern 2003).

Last but not least, in this paper we discussed the existence and importance of the business-variant corporate effect. It is worth mentioning that there is implicit evidence in previous studies that supports the existence of this effect. For example, Karniouchina et al. (2013) suggest that the importance of corporate effect changes along the industry lifecycle. That is to say that a corporate parent contributes differently to the performance of two of its subsidiary businesses, being active in two different industries, in different place in their industry lifecycle. In the present paper we explicitly discussed the existence and importance of business-variant corporate effect. However, we neither theoretically discussed the source of this effect nor did we show how a corporate parent particularly contributes to the performance of a given relatively small and attractive subsidiary. Both of these may motivate new research.

CONCLUSION

In this study we propose that taking business-variant corporate effect into account would significantly increase the estimation of corporate effects. In line with Bowman and Helfat (2001) and McGahan and Porter (2002), our results confirm that standard variance decomposition methods underestimate the impact of corporate level decisions on the performance of subsidiary businesses. We find that including some variables that affect corporate-level resource allocation decisions dramatically improves the explanatory power of the models in explaining business-level performance. Further, this inclusion reveals some rationales behind corporate-level strategies and decisions: our results suggest that corporate-level managers contribute more to the

performance of the businesses that simultaneously benefit from higher level of opportunities and are small compared to the whole corporation size. Further work is needed to deepen this mechanism and confirm that smaller businesses active in more attractive segments should receive more attention from corporate parents and therefore receive more resources than their sister businesses.

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TABLES

Table1. Variable description

Variables	Description
Dependent Variable	
Profit	Business segment's ROA in a given year
Independent variables	
Smallness (small)	relative size of the whole corporation to the size of a business segment
attract_dif (ADif)	the difference of the attractiveness of industry a subsidiary businesses is active in compared to of the average of whole portfolio of its corporate parent
attract_dif * smallness (Adif*small)	interaction term between attract_dif and smallness
Control variables	
	year, industry, corporation, and business segment full vectors of dummy variables

Table2. Comparison of the explained variance of each factor in the basic ANOVA model of current study and the previous studies

Method	Nested ANOVA		COV		HLM	
Study ^a	Basic model of current study	McGahan and Porter (1997) ^b	Roquebert (1996)	McGahan and Porter (1997)	Hough (2006)	Misangyi et al. (2006)
Data	Compustat	Compustat	Compustat	Compustat	Compustat	Compustat
Time frame	2001-09	1981-94	1985-91	1981-94	1995-99	1984-99
Sector	All ^c	All	Manuf.	All	All	All
Year %	0.6	0.3	0.4	2.4	0.6	0.8
Industry %	3.1	9.4	10.2	18.7	5.3	7.6
Ind-Year %	Not significant	N/A ^d	N/A	N/A	N/A	N/A
Corporate%	23.1	9.1	17.9	4.3	20.2	7.2
Ind-Corp Cov.%	N/A	N/A	0.0	-5.5	N/A	N/A
Ind-Year Cov.%	N/A	N/A	2.3	N/A	N/A	N/A
Business ^e %	23.9	35.1	37.1	31.7	40.1	36.6
Total explained%	50.7	53.9	67.9	51.6	66.2	52.2

- a. We focus here only on studies which used business unit ROA as the dependent variable
- b. Effects were added in the sequence of year, industry, corporate parent, and business unit.
- c. All except depository sector due to significant difference in ROA (See McGahan and porter, 1997)
- d. Not applicable
- e. Here refers to businesses segment, as all of the studies reported in the table used Compustat.

Table3. Descriptive analysis and pairwise correlations

	Mean	S.D.	Min	Max	profit	small	Adif	ADif*small
Profit	0.074	0.458	-27.54	8.48	1.00			
smallness (small)	9.617	32.76	1.002	1251	-0.03	1.00		
attract_dif (ADif)	0.000	0.966	-5.576	4.796	0.02	0.03	1.00	
ADif*small	0.999	29.027	-330.65	1498	0.06	0.44	0.36	1.00

Table4. Regression models

VARIABLES	(1) profit	(2) profit	(3) profit	(4) profit	(5) profit	(6) profit
smallness (small)		-0.000176 (0.000128)		-0.000560*** (0.000174)		5.29e-05 (0.000238)
attract_dif (ADif)			0.0223 (0.0144)	0.0142 (0.0145)		0.00739 (0.0110)
ADif*small				0.000883*** (0.000194)		0.000575** (0.000227)
Constant	-0.106 (0.270)	-0.106 (0.270)	-0.0905 (0.310)	-0.0860 (0.309)	5.117 (4.157)	1.982 (1.606)
Observations	12,645	12,645	9,109	9,109	12,645	9,109
Adj-R-squared	0.268	0.268	0.354	0.356	0.507	0.785
R-squared	0.339	0.339	0.441	0.442	0.645	0.855

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

a. Year, industry, and corporate dummy variables are control variables in regression modes 1 through 4.

b. Year, industry, corporate and business dummy variables are control variables in regression modes 5 and 6.

Table5 The comparison between the effects estimated by basic and proposed models

explained variance %	year	industry	ind-year	business-invariant corporate effect	business-variant corporate effect	business-segment	whole model
Basic model	0.6	3.1	Not significant	23.1	N/A	23.9	50.7
Proposed model	0.3	3.1	Not significant	23.1	8.8	42.9	78.5