How increased diversification affects the efficiency of internal capital market?

Rong Guo
Columbus State University

ABSTRACT

This paper investigates the effect of increased diversification on the internal capital market. Previous literature examines the relationship of lowering diversification level and internal capital market. They find that internal capital market becomes more efficient as firms spin off poorly performing segments. This paper examines how the efficiency of the internal capital market changes after a firm adds new segments. It is demonstrated that for diversified firms, there is a strong and significant negative relationship between the number of segments and the diversity in investment opportunities. As previous literature shows that it is the diversity in investment opportunities among the segments of diversified firms that drives the internal capital market inefficiency, this may imply that firms with more segments may have a more efficient internal capital market than firms with fewer segments. The firms that become more diversified are better performers than firms that do not, after other variables that can affect firm value are controlled for. The results of this paper show that after firms add new segments, diversity in investment opportunities decreases. There are no significant changes in relative excess investment, efficiency of investment allocation, and excess value. The change in excess value is negatively related to the diversity measure, implying the firms that have the biggest decrease in diversity after being more diversified have largest increase in excess value.

Key words: diversification, internal capital market, efficiency, diversity in investment opportunities, diversity cost hypothesis

INTRODUCTION

It has been argued that internal capital market can add value to diversified firms. An internal capital market is where the internally generated cash flows of different divisions are pooled, allowing a diversified firm to allocate resources to its best use. According to Myers and Majluf (1984), if the costs to the old shareholders of issuing shares at a bargain price outweigh the projects' NPV, firms may choose to forgo positive NPV projects, which results in an underinvestment problem. Because there are less asymmetric information problems in internal capital markets than in external capital markets, diversified firms can allocate resources more efficiently through their internal capital markets and reduce the underinvestment problem. In the presence of significant external financial costs, internal capital market is a valuable real option for diversified firms, because it allows the firms to allocate capital across segments and avoid external financing more often (Matsusaka and Nanda, 1996). Stein (1997) suggests that diversified firms can create value by winner-picking even when it cannot relax the overall credit constraints. Actually, diversified firms can relax credit constraints due to their lower overall risk, thereby raising more in total than the individual segments could as stand-alones.

Internal capital market also has its dark side. As Stulz (1990) points out, diversification creates another problem: cross-subsidization. That is, diversified firms tend to overinvest in the low-performing business and underinvest in the high-performing business. Stein (1997) also warns that the flip side of the winner-picking is loser-picking. If the firm picks the loser, the segments that have relatively less investment opportunities are allocated too many resources, leaving some of the better projects in other segments underinvested. Another example that internal capital market is value decreasing is the failing business segment. If the failing business segment is operated independently, it cannot have a value below zero. However, as a segment of a conglomerate, it can be subsidized by the more profitable segments of the same conglomerate and have a negative value. Therefore, if the firm ends up picking the loser instead of the winner, internal capital market makes the “loser” lose more than it can as a stand-alone firm.

Internal capital market inefficiency can be explained by the diversity cost hypothesis. According to the diversity cost hypothesis, it is the diversity in investment opportunities across the segments of a diversified firm that worsens the intrafirm rent-seeking and causes the inefficiency of the internal capital market. Burch and Nanda (2001) study a sample of 108 spin-offs announced during 1979-1996 and find evidence in consistent with their hypothesis. The diversity in investment opportunities decreases after spin-offs, and it is an important factor in explaining the value increase after the spin-offs. They also mention that their results are mainly driven by firms that do poorly before the spin-offs.

Spin-offs usually result in a decrease in the number of segments. What will happen to internal capital market if there is an increase in the number of segments? This paper studies how diversification affects the efficiency of internal capital market. First, it examines how the diversity in investment opportunities changes after firms add new segment. Unlike what implied literature on spin-offs, there is a strong and significant negative relationship between the number of segments and the diversity in investment opportunities for diversified firms. The diversity in investment opportunities decreases

after firms add new segments. Next, this paper investigates what kind of firms is more likely to increase segments, and how this increased diversification affects firm value. It seems that the better performed firms are more likely to add new segments. There are no significant changes in relative excess investment, efficiency of investment allocation, and excess value when diversification level increases. Finally, the diversity cost hypothesis is tested for firms that increase their diversification level. The evidence is in support of diversity cost hypothesis. The change in excess value is negatively related to the change in the diversity measure, implying the firms have biggest decrease in diversity after increasing segments have largest increase in excess value.

LITERATURE

There is substantial literature documenting the existence of internal capital market. For example, Lamont (1997) finds that when oil prices fall, the parent firms of the oil segment also reduce the investment in the non-oil segments. Shin and Stulz (1998) look into other diversified firms as well and show that cash flows in one part of the firm affect investments in another part of the firm.

Other studies show that the internal capital markets of diversified firms can be inefficient. For instance, Scharfstein (1998) provides evidence of cross-subsidization among divisions of diversified firms. He finds that relative to their stand-alone industry peers, segments with more investment opportunities tend to underinvest and segments with fewer investment opportunities tend to overinvest. For diversified firms with low management ownership, this type of "socialism" that investments tend to get equalized across segments is especially pronounced.

The inefficient internal capital market can be explained by the agency theory. In particular, Scharfstein and Stein (2000) discuss the relationship of divisional rent seeking and inefficient investment. In their model, the marginal return to productive activity is lower in divisions with poor investment opportunities; therefore, the managers of these divisions devote more time trying to capture rents and perks for themselves. Since the headquarters themselves are the agents of the shareholders, they induce these managers not to rent seeking by giving them an excessive capital budget, thus misallocate capital and decrease the firm's value.

Rajan, Servaes, and Zingales(2000) also discuss issues that arise from the misalignments of incentives between central and divisional managers. They argue that the rent seeking and bargaining between divisional managers and corporate headquarters can result in misallocation of investments across divisions. In their model, the firm value is determined by the disparity in investment opportunities across divisions. The more the diversity of investment opportunities across different segments, the lower the excess value of the firm. Their empirical evidence for diversified firms during the period of 1980 and 1993 is consistent with their internal power struggle model, that is, for firms with higher diversity in resources and opportunities, resources flow to the more inefficient investment.

Burch and Nanda (2003) uncover the importance of the diversity in investment opportunities in affecting firm's value. The changes in firm's value can only be weakly related to the changes in investment allocation. However, the diversity in investment opportunities is significantly related to the excess value even after the contemporaneous

investment policy is controlled for. Their results suggest that diversity in investment opportunities can destroy firm's value through ways other than investment allocation. For example, lobbying efforts by divisional managers can cause value loss even though these efforts do not lead to distorted investment policy. They also find that although there is a decrease in the aggregate excess value for forty percent of observations in their sample, the aggregate excess value generally increases after spinoffs. The value improvements from spinoffs are mostly driven by firms that perform poorly before the spinoffs. Spinoffs are restructuring events when diversified firms reduce their number of segments. It can be interesting to examine the opposite, that is, what happens when diversified firms add new segments. How the diversity in investment opportunities and firm value change after spinoffs? What kind of firms choose to increase their number of segments? Does the diversity cost hypothesis still hold when diversified firms add new segments? These are some questions that are examined in this paper.

DATA AND METHODOLOGY

The sample consists of all diversified firms with data reported on the Compustat Industry Segment database from 1992 to 2003. The Berger and Ofek (1995) sample selection criteria are followed and observations are excluded if the firm reports segments in the financial sector (SIC 6000-6999), has sales less than $20 million, the sum of segment sales deviates from total sales by more than one percent, or the market value of the firm is missing. Two measures for the diversity in investment opportunities are used. The first measure RSZ, which is proposed in Rajan, Servaes, and Zingales (2000), is the standard deviation of asset-weighted investment opportunities across segments. The other measure BN is based on the model of Scharfstein and Stein (2000), which is the weighted standard deviation of equally weighted investment opportunities across segments. The calculation of these two diversity measures, relative excess value and investment efficiency can be found in Burch and Nanda (2003). The results of the first two tables are derived using the full sample of diversified firms. A sub-sample of diversified firms that increase their number of segments during the sample period is used in the last two tables.

RESULTS

Burch and Nanda (2003) find that the diversity in investment opportunities decreases after spinoff (when firms reduce their number of segments). It seems to imply a positive relationship between the number of segments and the diversity in investment opportunities. However, this relationship does not hold for the full sample of diversified firms. Table 1 presents the correlation matrix of the number of segments, the two diversity measures, leverage, herfindahl index, relative excess investment and investment efficiency. As can be seen from the table, the number of segments is negatively related with the diversity measures. The correlation with RSZ is -0.39, and the correlation with BN is -0.056. Both of the correlations are significant at the one percent level. It follows that the more diversified a firm is, the lower the diversity in investment opportunities across its segments. The leverage is positively related to the number of segments, which implies that firms with more segments can borrow more. The two diversity measures (RSZ and BN) are only 6.4% correlated.

The firms that choose to spinoff usually are poor performers. Do diversified firms that increase their segments perform better than their counterparts that do not increase their segments? A dummy variable is used to differentiate diversified firms that increase their segments in any year during the sample period from those diversified firms that do not. Table 2 provides the regression results of excess value on this dummy variable after other variables that may affect firm value are controlled for. Consistent with previous literature on diversification, excess value is positively related to firm size, profitability, capital expenditures, leverage, and investment opportunities. The coefficient of the dummy variable is positive for both the OLS regression and fixed effects regression, which indicates that diversified firms that add new segments tend to be better performers than those firms that do not.

Table 3 displays the results of how the diversity in investment opportunities and excess value change after firms add new segments. After diversified firms add new segments, leverage increases, while the diversity in investment opportunities and profitability decrease. There is no significant change in relative excess investment, investment efficiency, and excess value. The median firm in the sample increases its segments from two to four. The mean (median) debt ratio increases from 0.503 (0.495) to 0.534 (0.515). Li and Li (1996) study the relationship between the operational scope and financial structure. Their theory points out that diversification can be efficient if leverage increases at the same time. The higher leverage can be used as an effective bonding device for management, thus lowering the agency costs and improving the performance. The firms that become more diversified generally increase their leverage simultaneously, implying that the increased diversification can be efficient and create value for these firms.

Finally, the diversity cost hypothesis is tested for firms that increase their diversification level. The results are shown in Table 4. The first column uses *BN* as the diversity measure, while the third column uses *RSZ* as the diversity measure. The results indicate that firms with the largest decrease in diversity in investment opportunities experience the highest value increase after being more diversified. This is consistent with the diversity cost hypothesis. There is no significant relationship between the change in excess value and the change in relative excess investment and investment efficiency. This is consistent with Burch and Nanda (2003) that diversity in investment opportunities is more important than relative excess investment and investment efficiency in explaining the value change around the restructuring events for diversified firms.

CONCLUSION

This paper examines how increased diversification affects the efficiency of internal capital market. The empirical results indicate that diversified firms that add new segments are better performers than firms that do not. The results also show that there is a negative relationship between the number of segments and the diversity in investment opportunities for diversified firms. After firms add new segments, diversity in investment opportunities decreases significantly, while there is no significant change in relative excess value, investment efficiency and excess value. The firms with the largest decrease in diversity in investment opportunities experience the biggest increase in excess value, which supports the diversity cost hypothesis.

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Table 1
Correlation Matrix of the Number of Segments, Diversity Measures, Relative Excess Investment and Investment Efficiency

This table displays the correlation matrix of the number of segments, diversity measures, relative excess investment, and investment efficiency. NSEG is the number of business segments a firm has, LEVER is the ratio of total debt to total assets, RSZ is the standard deviation of asset-weighted segment q's and BN is the asset-weighted standard deviation of equally weighted segment q's, HERF is the Herfindahl index, RINV is the relative excess investment, and INVEFF is the investment efficiency.

	NSEG	LEVER	RSZ	BN	HERF	RINV	INVEFF
NSEG	1.00000	0.01999	-0.39043	-0.05601	-0.64589	-0.05371	-0.00864
		0.0116	<.0001	<.0001	<.0001	<.0001	0.2911
	16171	15940	16171	16171	16171	14936	14944
LEVER		1.00000	-0.04516	-0.02612	-0.03188	-0.02595	0.00424
			<.0001	0.0010	<.0001	0.0016	0.6065
		15940	15940	15940	15940	14741	14749
RSZ			1.00000	0.06387	0.81776	-0.09920	-0.00266
				<.0001	<.0001	<.0001	0.7447
			16171	16171	16171	14936	14944
BN				1.00000	0.05380	-0.00020	0.01700
					<.0001	0.9805	0.0376
				16171	16171	14936	14944
HERF					1.00000	-0.07128	0.01448
						<.0001	0.0767
					16171	14936	14944
RINV						1.00000	0.05262
							<.0001
						14936	14936
INVEFF							1.00000
							14944

Table 2
Summary Statistics Before and After Diversified Firms Adding New Segments

This table displays descriptive statistics before and after diversified firms adding new segments. ASSETS is the book value of total assets. TOBINQ is the market to book ratio of the firm. HERF is the Herfindahl index, NSEG is the number of business segments in which a firm operates as a measure of firm diversification. EXVAL is the natural logarithm of a firm's actual value to its imputed value. A firm's imputed value is the sum of the imputed value of its segments, with each segment's imputed value equal to the segment's sale multiplied by its industry median ratio of capital to sales. RSZ is the standard deviation of asset-weighted segment q's and BN is the asset-weighted standard deviation of equally weighted segment q's, RINV is the relative excess investment, and INVEFF is the investment efficiency. EBIT/SALES is the ratio of EBIT to total sales, CAPX/SALES is the ratio of capital expenditures to total sales, and LEVER is the ratio of total debt to total assets.

Variable	Before (N=755)			After (N=852)			Difference	
	Mean	Median	Std Dev	Mean	Median	Std Dev	t-stat	z-stat
ASSETS	2750.11	631.866	5684.06	3040.74	709.307	6072.98	0.99	0.98
TOBINQ	1.234	1.006	0.725	1.187	0.964	0.800	-1.23	-1.23
HERF	0.568	0.541	0.178	0.441	0.409	0.161	-14.95	-15.69
NSEG	2.754	2.000	1.020	4.027	4.000	1.201	22.98	23.88
EXVAL	-0.047	-0.048	0.539	-0.049	-0.048	0.541	-0.06	-0.06
RSZ	0.299	0.279	0.180	0.231	0.207	0.120	-8.87	-8.91
BN	0.127	0.077	0.159	0.119	0.079	0.132	-1.00	-1.00
RINV	0.952	0.480	1.515	1.069	0.529	2.107	1.23	1.23
INVEFF	-0.030	0.000	0.670	0.047	0.000	1.375	1.41	1.52
EBIT/SALES	0.083	0.080	0.103	0.070	0.075	0.107	-2.51	-2.61
CAPX/SALES	0.084	0.046	0.131	0.090	0.045	0.206	0.77	0.78
LEVER	0.503	0.495	0.190	0.534	0.515	0.200	3.13	3.32

Table 3
OLS and Fixed Effects Regression of Excess Value on Increasing Segment Indicator

This table displays OLS and Fixed effects regression of excess value on increasing segment indicator. EXVAL is the natural logarithm of a firm's actual value to its imputed value. A firm's imputed value is the sum of the imputed value of its segments, with each segment's imputed value equal to the segment's sale multiplied by its industry median ratio of capital to sales. DUMMY is the increasing segment indicator that takes the value of one if it increases segment in a given year and zero otherwise. LSIZE is the natural log of the book value of total assets. EBIT/SALES is the ratio of EBIT to total sales, CAPX/SALES is the ratio of capital expenditures to total sales, LEVER is the ratio of total debt to total assets, and TOBINQ is the market to book ratio of the firm. The column one contains the parameter estimates, and the column two contains the t-statistics.

Variable	OLS (1)	OLS (2)	Fixed Effects (1)	Fixed Effects (2)
INTERCEPT	-0.931	-47.71	-2.579	-13.62
DUMMY	0.051	3.12	0.038	3.25
LSIZE	0.057	22.87	0.133	15.21
EBIT/SALES	0.395	9.11	0.048	0.94
CAPX/SALES	0.527	14.76	0.423	9.61
LEVER	0.038	1.97	0.081	.021
TOBINQ	0.307	47.95	0.418	52.70
N	11244		11244	
R^2	0.266		0.785	

Table 4
Regression Results for Change in Excess Value around Diversification

This table contains results from regressing change in excess value on various control variables. EXVAL is the natural logarithm of a firm's actual value to its imputed value. HERF is the Herfindahl index, RSZ is the standard deviation of asset-weighted segment q's and BN is the asset-weighted standard deviation of equally weighted segment q's, RINV is the relative excess investment, and INVEFF is the investment efficiency. CHERF is the change in HERF, CRINV is the change in RINV, CINEF is the change in INEF, CBN (RSZ) is the change in BN (RSZ), CSIZE is the change in firms' book value of assets. LSIZE is the natural log of the book value of total assets. EBIT/SALES is the ratio of EBIT to total sales, CAPX/SALES is the ratio of capital expenditures to total sales, LEVER is the ratio of total debt to total assets, and TOBINQ is the market to book ratio of the firm. The column one contains the parameter estimates, and the column two contains the t-statistics.

Variable	BN		RSZ	
	(1)	(2)	(1)	(2)
Intercept	0.031	0.41	0.027	0.34
CHERF	0.053	0.90	0.051	0.70
CSIZE	0.206	2.97	0.214	3.02
CRINV	0.005	0.68	0.003	0.41
CINEF	-0.006	-0.64	-0.012	-1.26
CBN (CRSZ)	-0.483	-5.08	-0.121	-0.93
LSIZE	0.010	1.18	0.011	1.27
EBITTOSALES	-0.255	-1.64	-0.272	-1.72
CAPXTOSALES	-0.024	-0.28	-0.010	-0.12
LEVER	0.020	0.25	0.006	0.07
TOBINQ	-0.100	-4.10	-0.100	-4.03
N	755		755	
R^2	0.078		0.043	