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The More-Money and Less-Cash Effects of Diversification: Evidence from Japanese firms

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Abstract

Firms that operate in multiple industries can use cash flow generated by a business to fulfill the debt obligations and investment needs of other businesses. Because of such coinsurance effect, industrial diversification may increase firms' optimal leverage and also enable them to hold less liquidity for precautionary motives. I examine this possibility based on a sample of public Japanese firms. Regressions show that after controlling for various determinants of capital structure, diversified firms are significantly more leveraged, while holding less cash, than representative focused firms in the same industries. Moreover, these effects are stronger for more diversified firms and robust to control for unobserved heterogeneity and endogeneity. My results lend support to the view that diversification increases the financial flexibility of firms by enlarging the size and scope of internal capital markets.

***Keywords*:** Corporate diversification, Coinsurance effect, Debt, Cash, Japan

***JEL classification*:** G32; L25

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1. Introduction

The finding of diversification discounts by Berger and Ofek (1995) and Lang and Stulz (1994) has generated considerable interest in the behavior and performance of diversified firms. In particular, the working of internal capital market, in which funds are reallocated across businesses within a firm, has attracted a central attention of researchers. An influential strand of research examines the efficiency (inefficiency) of internal fund flows (e.g. Shin and Stulz, 1998; Rajan, Servaes, and Zingales, 2000). There is also a view, which dates back to at least Lewellen (1971), that the internal capital market improves the access of diversified firms to external finance. Stein (2003) refers to this as the "more-money effect" of diversification. Unlike the "smarter (dumber)-money effect," which has been the main focus of existing research, empirical evidence on this effect began to appear only recently. Notable contributions include Ahn, Denis and Denis (2006), Duchin (2010), Subramaniam, Tang, and Zhou (2011), and Aivazian, Qiu, and Rahaman (2015). The present article seeks to contribute to this bourgeoning literature by estimating the effect of firm scope on the capital structure of Japanese firms.

Lewellen (1971) claims that diversification increases the borrowing capacity of a firm because firms that operate in multiple industries can use the cash flow generated by a business to meet contractual obligations of other businesses. Because of such a coinsurance effect, diversification lowers the distress and bankruptcy risks of a firm, thereby increases its access to debt and optimal leverage (more-money effect). Duchin, (2010) and Subramaniam, Tang, and Zhou (2011) note that diversified firms' ability to reallocate funds across divisions also implies a less-cash effect. That is, diversification enables firms to decrease liquidity holdings that are necessary to avoid distress and

underinvestment due to unanticipated changes in cash flows and growth opportunities. Therefore, diversification can be an important determinant of corporate liquidity as well as capital structure.

The present article adds evidence on these effects by estimating the effects of firm scope on the leverage and cash holdings of Japanese firms. An important obstacle to identifying these effects is that corporate finance differs considerably across industries (e.g., Lemmon, Roberts, and Zender, 2008). Despite such heterogeneity, unambiguously matching diversified firms and focused firms in the same industry is difficult because by definition, the former operate in multiple industries. To address this problem, I match diversified firms' reporting segments and focused firms, following the methodology of Berger and Ofek (1995) in their seminal contribution to the diversification discount literature. That is, I create excess measures of leverage and cash holdings by comparing the actual leverage (cash holdings) of a firm to the segment-weighted value of representative focused firms' leverage (cash holdings) in the same industries.

The excess measures of leverage and cash holdings reveal that diversified firms indeed rely more on debt than focused firms, while holding less cash. These differences also appear in multivariate regressions that control for standard determinants of capital structure: the effect of firm scope on leverage and cash holdings is significantly positive and negative, respectively. Regressions also reveal that the magnitude of these effects increases with the degree of diversification. Within diversified firms, leverage is higher and cash holdings are lower for more diversified firms. These patterns are robust to controls for unobserved heterogeneity and endogeneity. Overall, the results reported in this article suggest that industrial scope is a fundamental determinant of corporate

liquidity and capital structure.

This study complements recent studies of the effect of diversification on corporate finance. Berger and Ofek (1995) and Comment Jarrell (1995) note that the coinsurance effect is economically unimportant by comparing unadjusted leverage of diversified firms and focused firms. However, based on an excess measure of debt, Ahn, Denis and Denis (2006) reveal that diversified firms are significantly more leveraged than focused firms. Also consistent with the coinsurance effect, Aivazian, Qiu, and Rahaman (2015) find that diversified firms bear significantly lower loan rates than focused firms. With regard to liquidity, Duchin (2010) and Subramaniam, Tang, and Zhou (2011) show that diversified firms hold significantly less cash than focused firms and this tendency is stronger for firms with a greater coinsurance effect. Tong (2012) suggests that diversified firms hold less cash because they have better access to bank credit lines. These studies all examine U.S. firms. No studies have jointly examined the effects of firm scope on leverage and cash holdings as I do in this article.

The rest of this article is organized as follows. The next section introduces data and the excess measures of capital structure. Sections III perform regressions. The final section is for conclusion.

2. Data

2.1. Sample

My sample is based on all Japanese firms that were publicly traded between 2001 and 2010. Consistent with previous studies, I define diversified firms as firms that have multiple segments that belong to different four-digit industries. The sample begins in 2001 because segmental reporting was introduced in Japan in 2000. Since that year,

all public firms have been required to report segmental revenue, operating income, assets, and depreciations if they have a segment whose revenue, operating income, or assets exceed 10% of the sum of all segments. In 2011, the Japanese generally accepted accounting principles adopted the management approach for segmental reporting in place of the traditional industry approach. The sample ends in 2010 to avoid potential discontinuities that may have been the result of this change.

I obtain segmental data from Nikkei NEEDS-FinancialQuest database, which assigns up to three Japan Standard Industrial Classification (JSIC) codes to each segment. When a segment has more than one JSIC codes, I use the first (primary) code to define its industry.[1] Following Berger and Ofek (1995), I exclude firms for which the sum of segmental assets exceeds or falls short of the firm-level sales by 25% or more. Firms with negative equity, financial firms (JSIC 6100-6750), firms with a segment in these industries based on the primary JSIC code, and firms with a segment coded "9999" (industries unable to classify) are also excluded. After excising observations with extreme values, the sample includes 23,946 firm-year observations.

2.2. Excess measures

To compare the capital structure of diversified firms and focused firms, I create excess measures of leverage and cash holdings by adopting Berger and Ofek's (1995) methodology to estimate the effect of diversification on firm value. Specifically, the excess measure of leverage is defined as follows:

[1] When multiple segments within a firm share the same primary 4-digit code, I merge them into one.

$$Excess\ debt_{it} = \left(\frac{Debt}{Asset}\right)_{it} - \sum_{j} \frac{sAsset_{ijt}}{\sum_j sAsset_{ijt}} \left(\widehat{\frac{Debt}{Asset}}\right)_{jt},$$

where the first term on the right-hand side is the debt-to-asset ratio of firm *i* in year *t*, *sAsset* is the firm's segmental asset in industry *j*, and $\widehat{Debt/Asset}$ is the median debt-to-asset ratio of focused firms in industry *j*. Therefore, excess debt is a firm's actual leverage minus the segment-weighted value of the median leverage of focused firms. It is positive (negative) if the firm has a debt-to-asset ratio that is larger (smaller) than that of representative focused firms in the same industries. The excess measure of cash holdings is similarly defined as follows:

$$Excess\ cash_{it} = \left(\frac{Cash}{Asset}\right)_{it} - \sum_{j} \frac{sAsset_{ijt}}{\sum_j sAsset_{ijt}} \left(\widehat{\frac{Cash}{Asset}}\right)_{jt},$$

where *Cash* is cash plus marketable securities.

Consistent with the diversification discount literature, in matching a segment to an industry, I define the industry at the four-digit level if five or more focused firms exist at that level. If the four-digit industry contains less than five focused firms, matching is performed at the finest lower digit level at which five or more focused firms exist.

2.3. Univariate analysis

Table 1 documents the median leverage and cash holdings of sample firms. As reported in Column (2), during 2001 to 2010, the ratio of diversified firms is essentially constant at around 45%. Columns (3) and (4) show the unadjusted leverage and cash holdings of focused firms. While the median debt-to-asset ratio of these firms declines over the sample period, their median cash-to-asset ratio increases steadily. Interestingly, a majority of focused firms are essentially debt free since 2004 in that the median cash holdings are higher than the median leverage.

Columns (5) and (6) report the median leverage and cash holdings of diversified firms. The capital structure of these firms shares the same trends with that of focused firms. Over the sample period, the median debt-to-asset ratio decreases by seven percentage points, while the median cash-to-asset ratio increase by three percentage points. However, the median leverage (cash holdings) of diversified firms is consistently higher (lower) than that of focused firms. Moreover the median leverage of diversified firms never goes below their median cash holdings.

Because the debt-to-asset and cash-to-asset ratios tabulated in Columns (3) to (6) are unadjusted for industry, the above-documented differences in asset liquidity and capital structure can be confounded by industry factors. To address this concern, Columns (7) and (8) report the median excess leverage and cash holdings of diversified firms.[2] Over the sample period, the median excess leverage and cash holdings of diversified firms are 9.0% and -4.5%, respectively. Therefore, industry-adjusted measures also suggest that diversified firms are more leveraged and hold less cash than focused firms in the same industries.

[2] The median excess leverage and cash holdings of focused firms are noted reported because they are by construction zero.

3. Regressions

3.1. Model

Corporate liquidity and capital structure depend on many factors other than industrial scope. In this section, I perform multivariate regressions to estimate the effect of firm scope while controlling for other potential determinants. The dependent variable is excess debt and excess cash introduced in the previous section. The regression model of excess debt is specified as follows:

$$Excess\ debt_{it} = \alpha + \beta \cdot Diversification_{it-1} + \gamma \cdot Z_{it-1} + \varphi_t + \theta_i + \epsilon_{it},$$

where *Diversification* is a dummy variable that takes the value of one for diversified firms and zero for focused firms. Z is a vector of control variables, φ is a year fixed effect, and θ is a firm fixed effect. I include firm fixed effects in some specifications because Lemmon et al. (2008) demonstrate that capital structure contains a large firm-specific component.

The control variables include logged sales as a measure of firm size, the ratio of fixed assets in total assets as a measure of asset tangibility, EBITDA/sales as a measure of profitability, Tobin's Q ratio as a measure of growth opportunities, cash flow volatility measured by the five-year standard deviation normalized by total assets, and R&D intensity defined as R&D expenditure/sales. Tobin's Q is defined as the sum of market equity and liabilities divided by total assets. Following previous studies of capital structure, all variables are lagged one year. To mitigate the influence of outliers, all continuous variables are winsorized at the bottom and top 1%. Research has found that similar factors affect corporate leverage and cash holdings in the opposite directions

(e.g. Opler et al., 1999). Accordingly, I adopt the same explanatory variables for the excess cash regression.

Table 2 reports the descriptive statistics of regression variables, which are jointly and separately tabulated for focused firms and diversified firms. I find that these two sets of firms differ in many respects other than industrial scope. While firm size and asset tangibility are significantly greater, profitability, cash flow volatility, and Tobin's Q are significantly lower for diversified firms. Previous studies of capital structure suggest that all of these features increase the leverage of diversified firms relative to that of focused firms (Rajan and Zingales, 1995; Lemmon et al., 2008; Frank and Goyal, 2009). Controlling for these factors is therefore crucial for reliably identifying the effect of firm scope on capital structure.

3.2. Regression results

Table 3 reports estimation results without firm fixed effects. Columns (1) and (2) show the main results of this study. The effects of diversification on the leverage and cash holdings of Japanese firms are significantly positive and negative, respectively, even after controlling for other determinants of capital structure. The estimated effect of diversification on excess debt indicates that ceteris paribus, the debt-to-asset ratio of diversified firms is 6.6 percentage points higher that of representative focused firms in the same industries. The effect of firm scope on leverage is economically important as it is equivalent to approximately 40% of the standard deviation of excess debt. The effect of diversification on excess cash is also large. Ceteris paribus, the cash-to-asset ratio is 3.3 percentage points lower for diversified firms. This difference corresponds to 30% of the standard deviation of excess cash.

In Columns (3) and (4), I examine the effect of diversification level by replacing the diversification dummy with diversification index, which is defined as the complement of the Herfindhal index of segmental revenue. This continuous measure of diversification increases with firm scope, ranging from zero (focused) to one (indefinitely diversified). I find that the coefficient for the index is significantly positive for excess debt and significantly negative for excess cash. Therefore, other things equal, more diversified firms are more leveraged, while holding less cash. To examine whether these patterns are driven by the variation of diversification level within diversified firms rather than the distinction between focused firms and diversified firms, the regressions performed in Columns (5) and (6) drop focused firms from the estimation sample. Compared to the full sample estimation results, the estimated coefficients for the diversification index are smaller in absolute value. However, they are highly significant and carry the same signs as in the preceding estimations. Evidence therefore indicates that diversification affects corporate asset and capital structures at the intensive as well as extensive margins.

3.3. Endogeneity

The endogeneity of firm scope is a highly debated issue in the diversification discount literature (Campa and Kedia, 2004; Villalonga, 2004). If low-value firms self-select into diversification, a discount for diversified firms can arise even without a causal effect of firm scope. Similarly, if firms with superior access to external capital tend to grow across industries, estimations that ignore such a tendency will overstate the effect of firm scope on capital structure. The estimations reported in Table 4 address this concern with alternative methods.

First, I perform two-step treatment effect regressions. The first step involves the estimation of a probit model to predict the probability of a firm's being diversified. In the second step, the excess debt and cash regressions are estimated with the inverse Mills ratio obtained from the probit as an additional control variable. Consistent with Campa and Kedia (2004) and ensuing studies, I use the share of diversified firms in the firm's 3-digit industry as an exclusion restriction. In calculating this share, I exclude the firm itself from both the numerator and denominator. Other predictors of the probit model include all control variables for the capital structure regressions and year dummies. The second-stage regressions reported in Columns (1) and (2) suggest that self-selection biases are not serious in the present data.[3] The coefficients for diversification dummy, which are significantly positive for leverage and negative for cash holdings, are comparable in magnitude to the estimates reported in Columns (1) and (2) of Table 3. Moreover, the coefficient for inverse Mills ratio is not significant in both regressions.

Lemmon et al. (2008) demonstrate that corporate leverage contains a large firm-specific component. As noted by the authors, ignoring such heterogeneity can seriously misguide the inference on the determinants of capital structure. To examine the influence of unobserved heterogeneity, regressions performed in Columns (3) and (4) incorporate firm fixed effects. The coefficient for diversification dummy is positive for excess debt and negative for excess cash as reported in Columns (3) and (4), respectively. Although the estimated effects of firm scope become smaller in size when unobserved heterogeneity is accounted for, they are highly significant. Therefore, latent

[3] The result of the first-stage probit is omitted from reporting but available from the author upon request.

firm-specific factors do not explain away the association between diversification and capital structure.

Regressions with firm fixed effects are robust to endogeneity associated with permanent firm attributes. However, they do not address endogeneity caused by time-varying factors. To cope with the both types of endogeneity, the fixed effects regressions performed in Columns (5) and (6) instrument the diversification dummy with the share of diversified firms in the 3-digit industry excluding the firm itself. The coefficient for diversification is significantly positive for excess debt and significantly negative for excess cash. Moreover, the estimated effects of firm scope are larger in absolute value when diversification is instrumented. As shown in Column (5), the debt-to-asset ratio of diversified firms is on average 4.0 percentage points higher than that of focused firms. Column (6) indicates that the cash-to-asset ratio of diversified firms is on average 3.6 percentage points lower than that of focused firms. Therefore, the more-money and less-cash effects of diversification in the finance of Japanese firms are robust to controls for unobserved heterogeneity and endogeneity.

4. Conclusion

Corporate diversification improves a firm's access to external finance because firms that operate in multiple industries can use cash flow generated by a business to fulfill debt obligations and investment needs of other businesses. Accordingly, diversification may increase a firm's optimal leverage (more-money effect), while decreasing the level of liquidity that is necessary for precautionary motives (less-cash effect). Using excess measures of debt and cash holdings, I test these effects for a sample of public Japanese firms. Regressions reveal that after controlling for standard

determinants of capital structure, diversified firms are significantly more leveraged and hold less cash than representative focused firms in the same industries. These results are robust to controls for unobserved heterogeneity and endogeneity. Moreover, the estimated effects of diversification on corporate asset and capital structures are economically important.

Research has documented that diversified Japanese firms are traded at a considerable discount relative to focused firms in the same industries (Ushijima, 2016). Whether the stock market discount for diversified firms arises despite or because of their financial characteristics documented in this article is an interesting topic for future research.

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Table 1: Median leverage and cash holdings of focused firms and diversified firms

	# Observations	Ratio of diversified firms	Focused firms		Diversified firms			
			Debt/Asset	Cash/Asset	Debt/Asset	Cash/Asset	Excess debt	Excess cash
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2001	2,027	0.449	0.173	0.138	0.315	0.087	0.116	-0.051
2002	2,134	0.456	0.154	0.134	0.316	0.092	0.106	-0.034
2003	2,276	0.461	0.151	0.139	0.304	0.089	0.109	-0.043
2004	2,282	0.457	0.140	0.141	0.287	0.091	0.102	-0.049
2005	2,377	0.456	0.133	0.146	0.259	0.095	0.090	-0.054
2006	2,452	0.432	0.124	0.140	0.240	0.088	0.078	-0.048
2007	2,578	0.440	0.107	0.137	0.222	0.095	0.068	-0.042
2008	2,660	0.449	0.108	0.143	0.229	0.091	0.071	-0.041
2009	2,631	0.444	0.123	0.159	0.259	0.106	0.088	-0.043
2010	2,529	0.439	0.112	0.175	0.246	0.116	0.087	-0.046
Total	23,946	0.448	0.131	0.145	0.264	0.096	0.090	-0.045

Table 2: Descriptive Statistics of regression variables

	All firms	Focused firms	Diversified firms	Difference [P-value]
Excess debt	0.061	0.029	0.100	0.071
	(0.173)	(0.165)	(0.175)	[0.000]
Excess cash	-0.008	0.017	-0.039	-0.056
	(0.112)	(0.125)	(0.085)	[0.000]
Diversification	0.448	0.000	1.000	-
	(0.497)	(0.000)	(0.000)	-
Firm size	10.49	10.00	11.08	1.075
	(1.510)	(1.324)	(1.514)	[0.000]
Asset tangibility	0.462	0.438	0.493	0.055
	(0.194)	(0.195)	(0.188)	[0.000]
Profitability	0.084	0.086	0.083	-0.003
	(0.073)	(0.079)	(0.066)	[0.004]
Cash flow volatility	0.025	0.029	0.021	-0.008
	(0.023)	(0.025)	(0.019)	[0.000]
Tobin's Q	1.171	1.226	1.102	-0.125
	(0.686)	(0.808)	(0.489)	[0.000]
R&D intensity	0.014	0.014	0.014	0.000
	(0.024)	(0.025)	(0.021)	[0.318]
# Observations	23,946	13,220	10,726	-

Note: Mean and standard deviation (in parentheses) are reported. Difference denotes the difference in mean (diversified firms minus focused firms). In brackets are associated p-values.

Table 3: OLS estimation results of excess debt and cash

Sample	All firms				Diversified firms	
Dependent variable	Excess debt	Excess cash	Excess debt	Excess cash	Excess debt	Excess cash
	(1)	(2)	(3)	(4)	(5)	(6)
Diversification dummy	0.066 ***	-0.033 ***				
	(0.006)	(0.003)				
Diversification index			0.152 ***	-0.067 ***	0.101 ***	-0.037 ***
			(0.014)	(0.006)	(0.019)	(0.008)
Firm size	-0.004 *	-0.009 ***	-0.004 *	-0.010 ***	-0.001	-0.007 ***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)
Asset tangibility	0.176 ***	-0.152 ***	0.175 ***	-0.153 ***	0.212 ***	-0.098 ***
	(0.017)	(0.010)	(0.017)	(0.010)	(0.023)	(0.013)
Profitability	-0.278 ***	0.268 ***	-0.291 ***	0.276 ***	-0.182 **	0.112 ***
	(0.042)	(0.031)	(0.043)	(0.031)	(0.075)	(0.037)
Cash flow volatility	-0.005	0.142 **	0.011	0.138 **	0.168	-0.023
	(0.094)	(0.070)	(0.094)	(0.070)	(0.166)	(0.109)
Tobin's Q	0.013 ***	0.004	0.012 ***	0.004	0.017 *	0.003
	(0.005)	(0.003)	(0.005)	(0.003)	(0.010)	(0.006)
R&D intensity	0.152	-0.012	0.124	-0.001	-0.004	0.069
	(0.104)	(0.107)	(0.104)	(0.108)	(0.182)	(0.106)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.079	0.163	0.086	0.162	0.067	0.076
# Observations	23,946	23,946	23,923	23,923	10,758	10,758

Note: In parentheses are robust standard errors. *** Significant at the 0.01 level. ** Significant at the 0.05 level. * Significant at the 0.10 level.

Table 4: Regressions of excess debt and cash with alternative estimation methods

Estimation method	Treatment effect		Firm fixed effects		Fixed effects instrumental variable	
Dependent variable	Excess debt	Excess cash	Excess debt	Excess cash	Excess debt	Excess cash
	(1)	(2)	(3)	(4)	(5)	(6)
Diversification dummy	0.065 ***	-0.030 ***	0.017 ***	-0.016 ***	0.040 ***	-0.036 ***
	(0.006)	(0.004)	(0.003)	(0.002)	(0.015)	(0.011)
Firm size	-0.004 ***	-0.010 ***	0.032 ***	-0.019 ***	0.031 ***	-0.017 ***
	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)	(0.002)
Asset tangibility	0.176 ***	-0.152 ***	0.178 ***	-0.266 ***	0.166 ***	-0.260 ***
	(0.006)	(0.004)	(0.010)	(0.007)	(0.011)	(0.008)
Profitability	-0.278 ***	0.270 ***	-0.330 ***	0.049 ***	-0.325 ***	0.042 ***
	(0.017)	(0.010)	(0.017)	(0.012)	(0.018)	(0.013)
Cash flow volatility	-0.011	0.152 ***	-0.342 ***	0.045	-0.339 ***	0.048
	(0.057)	(0.035)	(0.042)	(0.030)	(0.043)	(0.031)
Tobin's Q	0.013 ***	0.004 ***	-0.001	0.001	-0.001	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
R&D intensity	0.155 ***	-0.023	-0.137	-0.047	-0.160 *	-0.052
	(0.047)	(0.029)	(0.084)	(0.060)	(0.085)	(0.061)
Inverse Mills Ratio	0.001	-0.002				
	(0.004)	(0.002)				
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes	Yes	Yes
R-squared	0.079	0.163	0.842	0.809	-	-
# Observations	23,837	23,837	23,946	23,946	23,837	23,837

Note: In parentheses are standard errors. *** Significant at the 0.01 level. ** Significant at the 0.05 level. * Significant at the 0.10 level.