Multinationals and Cash Holdings

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Abstract

This paper challenges the widely accepted notion that firms' cash holdings increase as they become more international. Using foreign sales data across 58 countries, we show that cash holdings are actually negatively related to the amount of foreign sales. In addition, using a novel dataset on international firms' industrial diversification activities, we show how geographic and industrial diversification impact cash holdings jointly. We also compare the determinants of cash holdings across developed and emerging markets, and find some asymmetric effects. Multinationals from emerging markets frequently need more cash to support their international expansion, whereas the opposite is true for developed-market firms. Overall, we conclude that the liquidity needs of multinationals from emerging markets are different from those of their peers in developed markets.

EFM classification codes: 240, 620

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1. Introduction

This paper studies the links between cash management policies and companies' diversification activities, both geographical and industrial.

The literature has offered two main explanations for firm's cash holdings: 1) a precautionary motive, which implies that companies hoard cash today so as to not miss future investment opportunities; and 2) agency problems of higher cash holdings because firms with poorer governance tend to have higher cash holdings.

One of the most widely accepted stylized facts in the literature is that as firms globalize, their cash holdings increase. Indeed, the media frequently mentions cases of multinationals (MNCs) such as Apple, Microsoft, and others whose cash holdings keep accumulating. Bates, Kahle, and Stulz (2009) have provided partial explanations for the upward trend in the cash holdings of public US firms, finding support for precautionary motives, but not for agency-based explanations. This is consistent with Almeida, Campello, and Weisbach (2004), who find that firms mitigate the adverse effects of financial constraints by adopting a policy of greater cash retention.

Considerably less attention has been focused on the causes and consequences of industrial diversification. Duchin (2010) demonstrates that the average cash holdings of stand-alone firms are almost double the cash holdings of diversified firms, which hold less precautionary cash. This difference cannot be explained by economies of scale, growth opportunities, or cash flow volatility. However, internationally, the joint impact on cash holdings of these two dimensions of diversification (geographic and industrial) has not been considered. We find that these two dimensions are equally important and also interact with each other.

We study the relation between internationalization, industrial diversification, and cash holdings, using a large sample of 38,971 firms from all over the world since 1990. In particular,

we focus on explaining the difference in cash holdings of multinationals relative to non-multinationals by paying attention to those two important factors, geographical diversification and industrial diversification.

Our results shed more light on the stylized fact that multinationals from all over the world have higher cash holdings. Contrary to the hypothesis that multinationals hold more cash than wholly domestic firms, we find no evidence of a positive relation between multinationality and cash holdings at the firm level, once firm-specific observable and unobservable characteristics are taken into consideration. Indeed, the negative relation between internationalization and cash holdings suggests the existence of economies of scale in cash management for multinational corporations. We find that the rise in the average cash holdings reported in prior studies is due to different firms, with different cash needs, entering the sample.

We investigate the impact on cash holdings as firms diversify across different business segments. Our results suggest that more diversified MNCs hold more cash relative to focused MNCs. This is inconsistent with the view that global diversification complements industrial diversification. Our findings suggest that MNCs selling multiple products in multiple geographic regions are in greater need of cash.

Finally, we explore the consequences of multinationality and industry diversification for separate samples of emerging and developed markets. Our results suggest that the impact of these factors on cash holdings is asymmetric: foreign sales are negatively related to cash holdings in developed markets and positively related to them in emerging markets. Our evidence suggests that the benefits of internal capital dominate, and diversified firms need less cash, but only in developed markets.

This paper contributes to different areas of financial research. The first is cash management by multinational firms. Opler, Pinkowitz, Stulz, and Williamson (1999) have analyzed a trade-off

theory of cash (under which firms balance between the benefits and costs of holding cash). The later literature highlighted the benefits and costs of cash associated with the financing of corporate investments (Almeida, Campello, and Weisbach, 2004; Acharya, Almeida, and Campello, 2007; Bates, Kahle, and Stulz, 2009; Denis and Sibilkov, 2010; Duchin, Ozbas, and Sensoy, 2010), and agency problems (e.g., Dittmar and Mahrt-Smith, 2007; Dittmar, Mahrt-Smith, and Servaes, 2003; Harford, Mansi, and Maxwell, 2008; Jensen, 1986; Pinkowitz, Stulz, and Williamson, 2006). We show that diversification is an additional important variable, which can explain significant patterns of cash holdings around the world. Our findings complement the research by Pinkowitz, Stulz, and Williamson (2012). Their findings indicate that US multinationals have significantly increased their cash holdings since the late 1990s, and this cannot be explained by tax treatment of profit repatriations, regulation, or poor governance. We actually find a negative relationship between multinationality and cash holdings at the firm level. This result may seem surprising in light of the findings in Kahle and Stulz (2010) that multinational corporations (MNCs) have high cash holdings. In our analysis, where we do not adjust for all possible firm characteristics, we also find that firms' cash ratios increase with the degree of multinationality. However, our firm-fixed-effects-adjusted statistics suggest that unobservable firms' characteristics may have played an important role in the results reported in these studies. In addition, we show a strong interrelation between global expansion and industrial expansion. Our results suggest that more diversified MNCs hold more cash relative to focused MNCs, which contradicts the view that global diversification complements industrial diversification. Finally, we present evidence from around the world that reveals the differential effects in developed and emerging markets. The results show how cash policies are determined differently in different regions.

We proceed as follows. Section 2 describes our data sources and summarizes the empirical evidence on international cash holdings. Section 3 analyzes the impact of internationalization and diversification. Section 4 examines the separate impact of geographic and industrial diversification on the cash holdings of multinational companies from developed and emerging markets. Section 4 concludes the paper.

2. Data and Variables

The analysis covers firms in the Worldscope database for the years 1990 through 2011. Financial firms (SIC 6000-6999) and utilities (SIC 4900-4999) are excluded from the analysis. We also exclude from the analysis countries with fewer than 10 firms in the sample. Our main variable of interest is cash holdings as a percentage of total assets. In Table 1, we show the evolution of cash holdings for each year from 1990 to 2011. The average and median cash holdings increased substantially over the sample period (consistent with the US evidence in Bates, Kahle, and Stulz, 2009; and Pinkowitz, Stulz, and Williamson, 2012). The median ratios of cash and short-term investments to total assets were 8.74%, 9.07%, and 5.30% in 1990 and 11.96%, 13.93%, and 13.95% in 2011 for all countries, developed countries, and the United States, respectively. The table also shows that emerging-market firms have lower cash holdings than developed-market firms across the entire sample (a median cash ratio of 9.44% for emerging-market firms in 2011 versus 13.93% for developed-markets firms).

The sample includes a total of 38,971 active and inactive firms, in 58 countries. Table 2 describes the sample, which comprises 392,975 firm/year observations by country. The number of firms varies widely across countries, with the United States having the most firms and several East European countries the least (Estonia, Lithuania, and the Slovak Republic). Table 2 also shows the percentage of firms with foreign sales in each country, as well as the percentage of

firms that operate in different business segments. Foreign sales data are obtained from the Worldscope datatype of foreign sales (WC08731). Over 50% of the observations have positive foreign sales in Austria, Finland, Hong Kong, Ireland, the Netherlands, and Switzerland, and this percentage is 34% in the United Kingdom, 25% in Canada, and 21% in the United States.

Firm diversification is computed using Worldscope annual product segment information. Our segment diversification metric is the number of different industry segments the firm operates in, measured at the two-digit SIC level (following Opler, Pinkowitz, Stulz, and Williamson, 1999 for the United States). The number of business segments changes over time as firms concentrate or diversify their business activities. Consider the example of Albany International, a US textile multinational company (with 60% foreign sales). In the year 2000, the company introduced an additional product segment (Fabricated Metal Products, Except Machinery and Transportation Equipment).[1] From 2000 to 2010, the company continued to report data for three segments. However, in 2011, the number of segments of this company dropped to two again because of the divesting of a business unit.[2] Another example is the addition of an extra product segment by the Volkswagen group to its core segment. Until 1997, VW was a single-segment company, operating in the Transportation Equipment segment. However, owing to the creation of a new financial product[3] by the Volkswagen group's, from that year our database shows VW has two business segments reported: Passenger Car Leasing (with an SIC code of 7515) being the new addition.

[1] Press releases on October 4, 2000; http://www.albint.com: Albany, New York— Metso Corporation's (NYSE: MX; HEX: MEO) fiber and paper technology business area, Valmet, and Albany International Corp. (NYSE/PSE: AIN) announced today that they have agreed to a program intended to produce a broad cooperation in technology, marketing, sales, and services for the paper industry.

[2] Press releases on October 28, 2011 (BUSINESS WIRE); http://www.albint.com: Albany International Corp. (NYSE:AIN) announced today that it had agreed to sell its global Albany Door Systems ("ADS") business to ASSA ABLOY AB (the "Buyer") for $130 million, subject to customary post-closing adjustments.

[3] This product is claimed to be the first product on the market that combines insurance and leasing.

The last two columns of Table 2 report the number of firms that operate in more than one industry, as well as the average number of segments for these diversified firms. 33.69% of the firms in our sample have two or more segments reported on Worldscope. While the percentages of observations with positive foreign sales from Asian countries are lower, the percentages of observations having more than two segments are higher for those countries, such as China, Indonesia, and Singapore.

We use a number of control variables found by previous authors to explain cash holdings. Table 3 reports summary statistics of firm-level variables used[4] for the full sample. The level of cash is strongly related to a number of firm characteristics. When comparing firms above and below the median cash holdings, we can see that firms with above-median cash holdings are smaller, less leveraged, have lower capital expenditures, and have higher R&D expenses. In terms of foreign sales, firms in our sample have an average of 14% of their sales abroad. The median firm operates in a single business segment, but the average number of segments is 1.62. Figure 1 plots the average number of segments over time, as well as the percentage of firms that operate across multiple segments. Despite the spike in the percentage of firms operating in more than one industry segment in the beginning of 1990s, we observe a slightly decreasing trend in both measures of diversification coverage. Figures 2 and 3 show that this decreasing trend seems to be more pronounced in developed countries than in emerging countries. Figure 4 examines the average number of segments for multinational and non-multinational companies and indicates that both types of firms have decreased their average number of segments from a value of 2 in 1990 to 1.5 segments in 2011.

[4] We winsorize some firm-level variables (Tobin's Q, net working capital, cash flow, net equity, and net debt issues) at the 5% level.

3. Internationalization, Diversification, and Cash Holdings

3.1 The determinants of cash holdings

Table 4 presents results examining the cash holdings after controlling for firm characteristics. We estimate the following pooled time-series cross-sectional regression on cash holdings:

$$Cash_{it} = \alpha + \beta_1 (Multinationality_{it}) + \beta_i (Firm\ characteristics_{it}) + \varepsilon_{it}$$

Our main variable of interest is the Multinationality variable. The regressions use two measures of multinationality: (1) foreign sales as a percentage of total sales — Panel A; (2) a dummy variable indicating whether the firm foreign sales are above 25% of its sales — Panel B. Standard errors are clustered at the firm level to take into account the fact that residuals may not be independent within a firm.[5] We also include country dummy variables to control for systematic effects on cash holdings associated with certain countries[6]. In addition, we use year fixed effects to control for the overall trend in cash holdings.

Several variables have been devised to explain the variation in cash across firms. The explanatory variables we use are drawn from the literature on cash holdings for US firms (e.g., Opler, Pinkowitz, Stulz, and Williamson, 1999; Dittmar and Mahrt-Smith, 2007; Foley, Hartzell, Titman, and Twite, 2007; Harford, Mansi, and Maxwell, 2008; and Bates, Kahle, and Stulz, 2009). Column (1) of Panel A of Table 4 reports the results from estimating equation (1) controlling only for size, Tobin's Q, the net working capital, R&D, and leverage when foreign sales as the first proxy for multinationality is not introduced. The coefficients on the control

[5] In unreported results, the results are robust to clustering standard errors at the country level.
[6] For instance, Dittmar, Mahrt-Smith, and Servaes (2003) show that firms in countries with strong legal protection hold lower cash balances.

variables are consistent with prior findings: smaller and less leveraged firms hold higher cash reserves, as do firms with greater growth potential and higher R&D expenses.[7]

In column (2) of Table 4, we introduce foreign sales as an additional explanatory variable. We find that multinationality is positively associated with cash holdings. This is consistent with the findings of Foley, Hartzell, Titman, and Twite (2007), Pinkowitz, Stulz, and Williamson (2012), and Gao, Harford, and Li (2013). In column (2) of Table 4, the foreign sales coefficient is 0.013 and statistically significant at the 1% level.

In columns (3) to (6), we extend the model to include additional determinants of cash, namely, cash flow, capital expenditures, dividend, acquisition activity, and equity and debt issues. The coefficient on foreign sales remains positive and significant. Overall, the other determinants of cash are consistent with the previous literature. Large firms and firms that pay dividends (typically interpreted as indicating that firms have a greater ability to access capital) have less need to hold cash. Firms with strong growth opportunities and high levels of R&D expenditures hold more cash. This is consistent with a precautionary motive for holding cash, according to which firms with high future investment needs hold more cash in order to guarantee that they will not have to give up on future opportunities. The coefficient on capital expenditures is negative and significant: as firms pursue profitable investment opportunities, cash holdings are depleted. The table also reports the year dummies. They show how, consistent with the previous literature, cash holdings exhibit a positive time trend. Indeed, in column (5) the year dummies are always positive and significant after 1996, and reach approximately 0.03 in 2011.

[7] These characteristics are related to firm's financing constraints. Denis and Sibilkov (2010) show the value of higher cash holdings can come from allowing firms to undertake value-increasing projects that might otherwise be bypassed. Brown and Petersen (2011) show that firms use cash reserves to smooth R&D during the 1998–2002 period.

Column (7) presents estimates including an additional variable, tangibility of assets. It is defined as the ratio of fixed assets to total assets. The median firm in our sample has 27% of its assets invested in fixed assets (see Table 3). We expect firms with more tangible assets to hold less cash. First, tangible assets can be sold if a sudden need for cash arises. Second, firms with more collateral have more access to debt. Indeed, tangibility of assets has been found to be an important determinant of leverage policies (Titman and Wessels, 1988; Booth, Aivazian, Demirgüç-Kunt, and Maksimovic, 2001; Allayannis, Brown and Klapper, 2003; Fernandes, 2011).[8] The results in column (7) show that cash holdings decrease with asset tangibility. The result is economically significant. A one-standard-deviation-increase in tangibility is associated with a drop of about 5.4% in the cash-to-assets ratio.

Interestingly, the coefficient on foreign sales becomes insignificant after we control for tangibility. One potential explanation is that MNCs typically have a lower asset tangibility (in our sample, MNCs have an average tangibility of 27.5%, whereas domestic firms have 31.5%), but also a greater R&D intensity (the average R&D expenditure is 3.4% for MNCs and 2.4% for domestic companies). Once we control for these important determinants, there is no difference in cash holdings for firms with different levels of foreign sales.

The results in columns (2) to (7) include country fixed effects to control for fundamental differences in cash levels across countries. However, there can be other omitted variables correlated with cash holdings. To the extent that these characteristics are specific to a firm but do not change over time, we can control for them with firm fixed effects using pooled cross-sectional time-series (panel) data. Indeed, Pinkowitz, Stulz, and Williamson (2012) suggest that

[8] Falato, Kadyrzhanova, and Sim (2013) develop a dynamic model of corporate cash holdings that suggests greater amounts of intangible assets reduce firms' debt capacity and leads them to hold more cash in order to preserve financial flexibility. Also, tangibility of assets has been related to the investment–cash flow sensitivity by Almeida and Campello (2007).

multinationals have unique characteristics in terms of their cash holdings. Column 8 replicates this more complete model estimation including year fixed effects and firm fixed effects. Most control variables are robust to the inclusion of firm fixed effects, which controls for time-invariant unobserved firm heterogeneity.[9] An important difference arises when we look at the foreign sales coefficient. Indeed, in this complete model, foreign sales is negatively related to cash (the coefficient is −0.015 and significantly different from zero at the 1% level). In this model, the coefficient on foreign sales represents the marginal change in cash holdings due to increases in foreign sales. According to the coefficient, a one-standard-deviation increase in foreign sales lowers the cash holdings by 0.3%. This result is noteworthy given that the median cash holding in the sample is 11%. Another important result from this estimation is the magnitude of the estimated year dummies. Indeed, in the last columns of Table 4, the year dummies lose their significance. This means that observed (and unobserved) firm characteristics may be behind the rising trend in corporate cash holdings. The rise in the average cash holdings reported in Figure 5 is thus due to different firms, with different cash needs, entering the sample. It is not because the same firms have increased their needs from 1990 to 2011.

Our main analysis described above (Panel A of Table 4) uses the percentage of foreign sales as a proxy for the degree of multinationality. In Panel B of Table 4, we present similar evidence based on an alternative measure. We define a variable that is a 0-1 dummy variable that takes the value 1 when a firm's foreign sales in a given year is higher than 25% of the consolidated sales and 0 otherwise. The results are analogous to those of Panel A.

Overall, the results in Table 4 indicate that more multinational activity is associated with less cash reserves. The results with firm fixed effects show how, for a given firm, as the level of

[9] The only exception is R&D. Indeed, once we control for the type of firm (through firm fixed effects), higher R&D is associated with lower cash holdings.

foreign sales increases, it holds less cash. This suggests that there are economies of scale in cash holdings for multinational corporations. As the firm sells a higher percentage abroad, it becomes more diversified and needs to hold less cash than before.

3.2 Industrial diversification and multinationality

In the previous section, we showed that as a firm's foreign sales increases, it becomes more diversified and needs to hold less cash than before. In addition to diversifying through foreign expansion, firms can also pursue industrial diversification. Here, we investigate the diversification across different business segments and its significance for MNCs and their cash holdings.

Industrial diversification can impact cash holdings through firms' internal capital markets.[10] On the positive side (in terms of cash holdings), in diversified firms corporate headquarters can better plan the cash needs, taking into account the different cycles and the investment needs of each business. This would suggest lower cash holdings as firms become more diversified in terms of business segments. Using a large sample of US firms, Duchin (2010) shows how diversified firms have significantly lower cash ratios than single-segment firms. On the other hand, there are potential agency conflicts if divisional managers behave as rent-seeking agents and misallocate corporate resources (Rajan, Servaes, and Zingales, 2000; Scharfstein and Stein, 2000). This would suggest higher cash holdings as firms become more diversified.

Figure 5 shows the evolution of cash holdings for diversified firms relative to single-segment firms. Although this figure suggests some links between cash holdings and diversification, it does not control for systematic differences in the characteristics of the firms in the two subsamples.

[10] See Stein (2003) for a review of the potential benefits and costs of internal capital allocation.

In Table 5, we study the combined impact of global and industry diversification on cash holdings. As before, we introduce in all estimations all the previously used firm-level characteristics, as well as firm and year fixed effects. The results in column (1) replicate the more complete model of Table 4.

The results in column (2) show how diversification is negatively related to cash holdings. The first proxy of Multinationality, foreign sales, maintains its negative and significant coefficient, with no material difference from prior results.[11] The coefficient estimates for other control variables are similar to those documented before. These results are consistent with the precautionary savings theory of Keynes (1936). Diversification can insulate firms from the costs of external capital markets, through the workings of internal capital markets. As a result, firms that operate across a variety of business segments are better positioned to follow their investment opportunities in spite of holding lower amounts of cash. Indeed, provided the correlation between their divisions is not perfect, this result is expected.

The results in column (2) suggest that both forms of expansion (additional product segments and additional geographic markets) lead to some diversification benefits in terms of overall cash holdings. However, it is possible that these effects are interconnected. To explore this hypothesis, we expand the baseline model by including an interaction term between foreign sales and industrial diversification. Indeed, this empirical analysis questions whether industry and geographic diversification can be seen as synergistic or antagonistic in terms of cash holdings. If they complement each other, we expect a negative relation between this interaction variable and cash holdings. Otherwise, we expect a positive relation between this interaction variable and cash

[11] Morck and Yeung (1991) show that both industrial diversification and international diversification can add value based on synergies that can be explored by multinational companies.

holdings. This would mean that selling multiple products in multiple geographic regions increases the need for cash.

By considering both forms of diversification simultaneously (geographic and industrial), we obtain independent estimates of their impact on cash, as well as their joint interactive effect. We present the estimation results in column (3) of Table 5. Our interaction coefficient is positive and statistically significant at the 1% level. We note that the interaction term does not absorb the effect of the foreign sales and the industrial diversification. Taken together, these results complement our earlier findings in Table 4 that cash holdings are negatively associated with foreign sales.

As an alternative specification, in columns (4) to (6) we replace foreign sales in the baseline model with a dummy variable for MNCs having a foreign sales ratio higher than 25%. The results are unchanged for this alternative measure of multinationality.

The results here show how diversified MNCs hold more cash relative to focused MNCs. Contrary to the hypothesis that global diversification complements industrial diversification, we find no evidence of that complementarity. Multinational firms that operate across multiple business segments are more complex than single-segment multinational firms. This may make managers more concerned with firm-specific risk, leading to their holding more cash.

4. Cash Holdings in Developed and Emerging Markets

In the previous section, we have established that multinationality is negatively related to cash holdings. The results also establish that there is a decline in cash holdings as the number of business segments of the firm increases, which is consistent with a diversification hypothesis. But the findings also suggest some interaction between global and industrial diversification. This

indicates that as the extent of global diversification increases, the diversification impact of running a multi-segment firm on cash holdings becomes smaller.

In this section, we present separate regressions for developed and emerging markets. These allow us to isolate the impact of foreign sales and other firm characteristics on cash holdings in these two sets of countries, which have different characteristics and environments. Table 6 presents the results. Columns (1) to (6) report results for the developed-markets sample of firms using panel regression with firm and year fixed effects. In column (3), the estimated foreign sales coefficient is −0.035, and in column (6) the estimated coefficient of the dummy for MNC is −0.02, and both are statistically significant at the 1% level. The regression results for developed markets also confirm the previous findings on industrial diversification and its positive interaction with foreign sales.

Columns (7) to (12) report estimates for emerging markets. Our estimates suggest a very different impact of multinationality and industrial diversification in these markets. Contrary to the previous evidence, the coefficients on foreign sales and the dummy for MNC are positive and significant in emerging markets. Also, the estimated coefficients on industrial diversification and its interaction with foreign sales are both insignificant.

The signs of the coefficients of the other firm-level determinants of cash holdings are consistent in both developed and emerging markets with the previous findings. As in Table 3, smaller firms, and firms with higher growth, higher leverage, or higher value, tend to have lower cash holdings.

Overall, our evidence is consistent with an asymmetric relation between foreign sales and cash holdings with respect to the country's level of development: higher foreign sales in firms from developed markets leads to lower cash holdings, whereas firms in emerging markets with higher foreign sales hold more cash. We also show that diversification has a negative impact on

cash holdings, but this is concentrated in developed-market firms. Looking only at emerging markets, we find no significant impact of diversification on cash holdings.

Several potential factors may underlie these asymmetric findings. In emerging markets, most of the diversification occurs through business groups and interlinked ownership structures (Khanna and Yafeh, 2007), and thus the need for diversification within the firm may be lower.

Also, the hypothesis of lower cash holdings for diversified firms relies on an efficient cross-divisional transfer of funds to more productive segments where business opportunities arise. It is a well-known fact that internal capital markets in emerging-market firms work poorly, and several inefficiencies exist. Our results are in line with Khanna and Palepu (2000) and Fauver, Houston, and Naranjo (2004), who find that international differences in the value of diversification are related to the degree of development.

The precautionary demand for cash implies that cash levels vary according to the investment opportunities of the firm and how correlated the shocks to these investment opportunities are. Another potential explanation for the asymmetric result is that emerging-market firms are less diversified in their foreign expansion. Indeed, the average number of geographies that MNCs from emerging markets operate in is substantially lower than for developed-market firms (2.19 for emerging-market firms vs. 2.48 for developed-market firms).

5. Robustness Checks

We perform a number of robustness checks. In Table 7, we run our complete regression model by using alternative definitions of industrial diversifications. In Panel A, we use a dummy representing firms having more than one product segment. Panel B replaces this dummy with the dummy for two or more product segments. In Panel C, we exclude small firms by using a cut-off value of USD 10 million of market capitalization following Almeida, Campello, and Weisbach

(2004) (and a value of 100 million USD in unreported results). All the results for all samples as well as subsamples of developed and emerging markets are robust to those alternative definitions of diversification along with alternative definitions of multinationality.

Core results have used the cash ratio, that is, the sum of cash and short-term investments divided by total assets. We verify the robustness of the findings using as dependent variable the log of cash. The results stay the same. Sample definition issues could also be responsible for some of the results. For instance, the results may be dominated by the strong presence of US firms. We perform estimations that exclude the United States and obtain similar results. We also obtain similar results by following an alternative testing strategy in order to show that the results are not driven by changes in the sample over time: we focus exclusively on a subset of firms for which data is available over the entire time period. Finally, we run Fama–MacBeth two-step annual regressions. The results confirm the negative effects of industrial diversification and multinationality and the positive combined effect of these two variables.

Across all the different models, the core results hold, and importantly, we confirm that foreign sales and its interaction with diversification are important determinants of cash holdings in developed markets, but not in emerging markets.

5. Conclusion

In this paper, we study the relation between cash holdings and international and industrial diversification for a large worldwide sample of firms, since 1990.

Contrary to the recent findings, we find no evidence of a positive relation between multinationality and cash holdings at the firm level. Using firm-fixed-effects-adjusted statistics, our analysis underscores the important role of unobservable firms' characteristics in explaining the level of cash holdings. We report the evidence of statistically significant negative effects of

multinationality on cash holdings. This result suggests that there are economies of scale in cash management in multinational corporations, and as they globalize into different markets, they can reduce their average holding of cash (diversification benefits).

We also estimate the impact of business segment diversification on multinationals' cash holdings. Our different proxies for industrial diversification show lower cash holdings for diversified firms. When we examine the interrelation between global expansion and industrial expansion, which has been neglected in the recent literature, we find that geographical diversification and industrial diversification are supplementary as opposed to being complementary.

We also provide strong evidence that the determinants of cash holdings are different in developed and emerging market firms. The results suggest that when firms from different environment globalize, their cash needs differ. Indeed, we find that multinationality and industry diversification play an important role in determining the level of cash holdings for firms located in developed countries. But the effects are different in emerging markets. The results also suggest that internal capital markets work well in developed-market MNCs, but not so well in emerging-market ones.

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Figure 1: Average number of segments and percentage of diversified firms

The left axis refers to industrial segments, which are determined with the total number of industrial segment based on two-digit SIC codes in each year. The right axis refers to the percentage of diversified firms, which are defined as those having two or more product segments based on two-digit SIC codes.

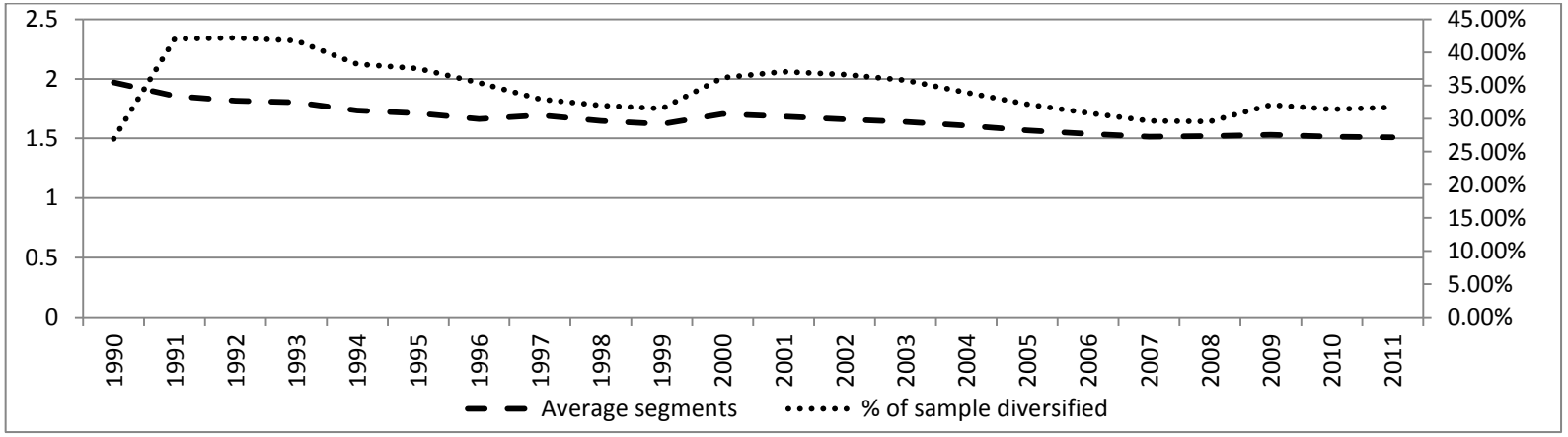

Figure 2: Average number of segments

Industrial segments are determined with the total number of industrial segment based on two-digit SIC codes in each year.

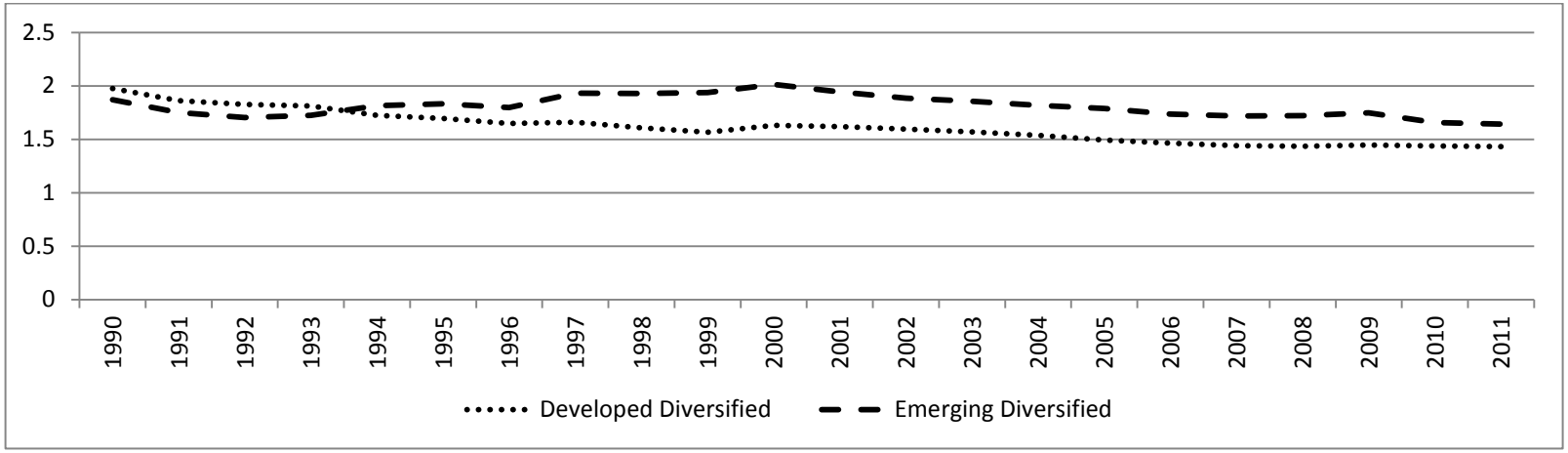

Figure 3: Percentage of firms that are diversified over time

Diversified firms are defined as having two or more product segments based on two-digit SIC codes.

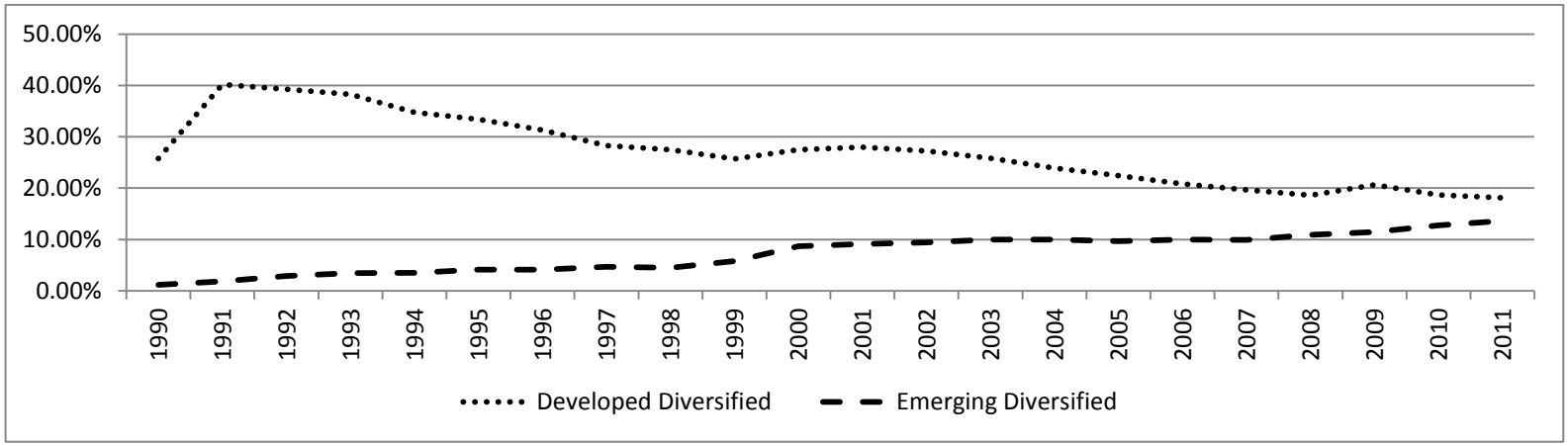

Figure 4: Average number of segments for MNCs and non-MNCs

Industrial segments are determined with the total number of industrial segment based on two-digit SIC codes in each year. Multinationals (MNCs) are firms with foreign sales higher than 25% of the consolidated sales in a given year.

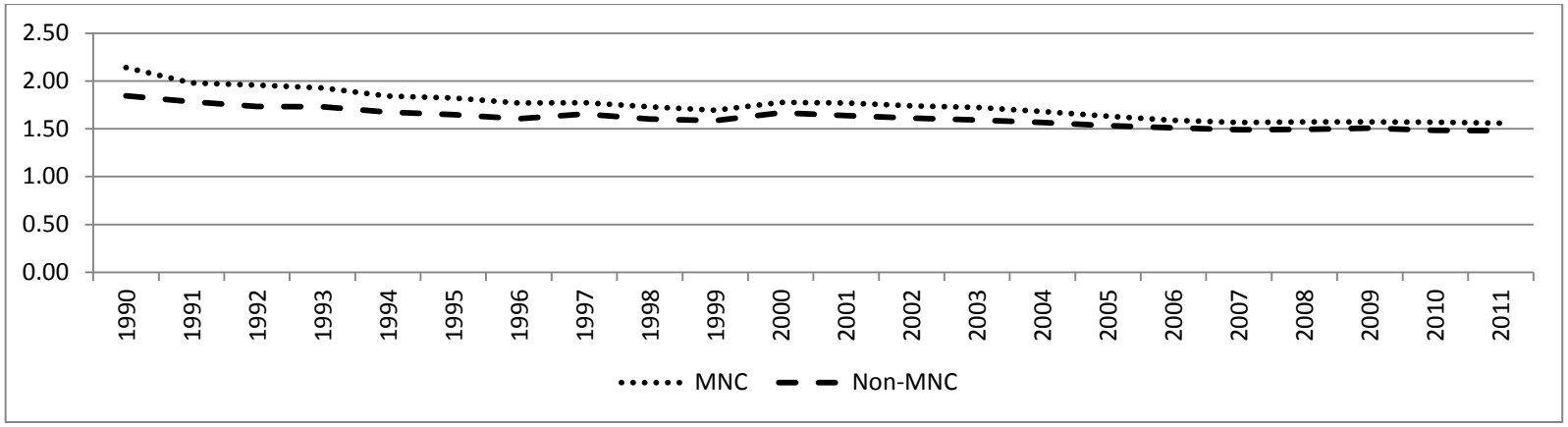

Figure 5: Average cash holdings for diversified and single-segment firms

Diversified firms are defined as those having two or more product segments based on two-digit SIC codes. Single-segment firms have only one segment. Cash holding is measured by the ratio of the sum of cash and short-term investments to the book value of total assets.

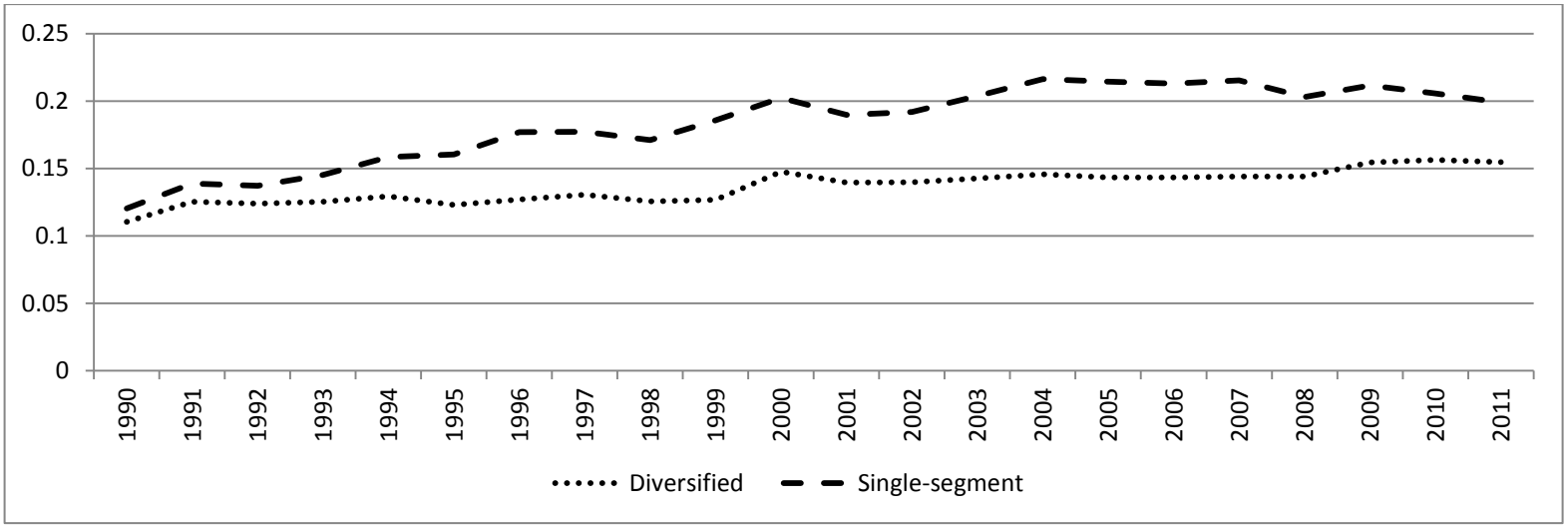

Table 1: Annual statistics of cash ratio

This table reports the number of observations, as well as the mean and median values of the cash ratio for all samples and some subsamples. MNCs indicates multinationals with foreign sales higher than 25% of the consolidated sales in a given year. The sample period is from 1990 to 2011. Cash Ratio is the cash and short-term investments / book value of total assets.

	All Sample				Developed Markets				Emerging Markets			
Year	N	MNCs	Mean	Median	N	MNCs	Mean	Median	N	MNCs	Mean	Median
1990	6864	1457	0.1293	0.0874	6475	1456	0.1320	0.0907	389	1	0.0834	0.0546
1991	7746	1624	0.1322	0.0909	7132	1623	0.1355	0.0955	614	1	0.0928	0.0598
1992	8334	1730	0.1307	0.0892	7378	1728	0.1363	0.0960	956	2	0.0877	0.0511
1993	8952	1871	0.1355	0.0914	7774	1859	0.1421	0.0991	1178	12	0.0922	0.0541
1994	10456	2067	0.1432	0.0950	9098	2043	0.1503	0.1026	1358	24	0.0958	0.0588
1995	11579	2371	0.1418	0.0878	9828	2336	0.1507	0.0963	1751	35	0.0915	0.0560
1996	13098	2668	0.1524	0.0884	11089	2607	0.1631	0.0972	2009	61	0.0931	0.0549
1997	14190	2877	0.1529	0.0900	11948	2801	0.1645	0.0985	2242	76	0.0914	0.0552
1998	16902	3239	0.1500	0.0855	14279	3152	0.1602	0.0930	2623	87	0.0946	0.0541
1999	19210	3409	0.1634	0.0921	15305	3270	0.1764	0.0987	3905	139	0.1126	0.0704
2000	20895	3953	0.1745	0.0976	16143	3681	0.1902	0.1075	4752	272	0.1210	0.0734
2001	22034	4401	0.1686	0.0946	16641	4032	0.1833	0.1004	5393	369	0.1231	0.0788
2002	22281	4711	0.1692	0.0989	16466	4224	0.1840	0.1055	5815	487	0.1273	0.0850
2003	22416	4758	0.1780	0.1069	16226	4216	0.1946	0.1161	6190	542	0.1346	0.0887
2004	23301	4876	0.1897	0.1153	16692	4287	0.2107	0.1273	6609	589	0.1366	0.0926
2005	23900	5070	0.1926	0.1183	17050	4419	0.2151	0.1315	6850	651	0.1368	0.0935
2006	24798	5188	0.1940	0.1175	17317	4511	0.2194	0.1324	7481	677	0.1353	0.0922
2007	25097	5325	0.1961	0.1180	17304	4618	0.2206	0.1311	7793	707	0.1417	0.0969
2008	24128	5327	0.1832	0.1113	16324	4531	0.2043	0.1204	7804	796	0.1391	0.0973
2009	21519	5070	0.1910	0.1256	14745	4303	0.2106	0.1358	6774	767	0.1483	0.1063
2010	23071	5403	0.1875	0.1247	14487	4388	0.2134	0.1436	8584	1015	0.1437	0.0992
2011	22204	5623	0.1826	0.1196	13736	4403	0.2101	0.1393	8468	1220	0.1381	0.0944
Total	392975	83018	0.1730	0.1054	293437	74488	0.1877	0.1138	99538	8530	0.1297	0.0857

Table 2: Sample countries and frequency of multinational and diversified firms

This table reports the frequency of sample firms as multinationals and industrially diversified by country. Multinationals (MNCs) are firms with foreign sales higher than 25% of the consolidated sales in a given year. Mean (and median) foreign sales is computed based on the sample of firms with positive foreign sales in that country. Diversified firms are defined as those having two or more product segments based on two-digit SIC codes. Mean (and median) number of segments is computed based on the sample of firms with more than one segment in that country.

	All Sample		Statistics for Multinationals			Statistics for Ind.Diversification		
Country	# of Obs.	# of Firms	% of MNC	Mean foreign sales	Median foreign sales	% with two or more segments	Mean number of segments	Median number of segments
Argentina	855	69	5.03	0.5081	0.5081	24.80	2.81	3.00
Australia	17017	1907	15.37	0.6829	0.6854	20.20	2.51	2.00
Austria	1214	122	59.64	0.7483	0.7490	36.90	2.56	2.00
Bahrain	57	13	12.28	0.3795	0.3626	21.05	3.00	3.00
Belgium	1629	163	43.03	0.6794	0.6640	38.06	2.69	2.00
Brazil	2614	154	6.69	0.4573	0.4582	12.47	2.43	2.00
Canada	17298	1961	25.72	0.7902	0.7949	14.35	2.31	2.00
Chile	1872	140	4.49	0.5945	0.5945	11.75	2.65	2.00
China	16526	1554	2.55	0.4696	0.5102	61.30	2.99	3.00
Colombia	355	34	3.10	0.4156	0.4283	3.38	2.00	2.00
Czech Republic	326	56	7.36	0.4277	0.4277	24.85	3.25	3.00
Denmark	2389	199	41.61	0.7106	0.7078	36.00	2.72	2.00
Egypt	361	41	3.32	0.6784	0.6784	12.47	2.30	2.00
Finland	1961	181	54.36	0.6609	0.6667	41.97	2.72	2.00
France	11370	1208	41.19	0.5521	0.5521	41.28	2.65	2.00
Germany	10438	942	42.94	0.5628	0.5654	41.37	2.53	2.00
Greece	3674	308	9.42	0.5582	0.5596	17.86	2.71	2.00
Hong Kong	9583	817	55.30	0.8345	0.8375	59.24	2.65	2.00
Hungary	422	37	28.91	0.5199	0.5199	27.96	2.28	2.00
India	11473	1921	9.98	0.6674	0.6872	31.99	2.50	2.00
Indonesia	3767	288	6.03	0.5431	0.5540	46.48	2.59	2.00
Ireland	1126	105	54.17	0.6763	0.6771	30.20	2.49	2.00
Israel	1490	141	40.00	0.8826	0.8739	30.34	2.76	2.00
Italy	3403	334	45.81	0.6121	0.6106	47.22	2.59	2.00
Japan	60988	3906	8.71	0.4137	0.4148	53.97	2.45	2.00
Jordan	72	18	19.44	0.8939	0.8799	13.89	2.00	2.00
Kuwait	127	33	19.69	0.6324	0.5991	48.82	2.63	2.00
Luxembourg	230	20	58.26	0.9280	0.9127	35.65	2.61	2.00
Malaysia	10627	925	14.09	0.5067	0.5107	53.98	3.16	3.00
Mexico	1821	166	13.23	0.5092	0.4871	29.60	2.50	2.00
Morocco	168	15	1.19	0.5501	0.5501	17.26	5.00	5.00

Table 2 continues

Netherlands	2854	258	58.55	0.6620	0.6600	35.95	2.40	2.00
New Zealand	1381	145	18.97	0.4908	0.5073	28.89	2.63	2.00
Norway	2490	291	36.22	0.6834	0.6895	31.93	2.46	2.00
Pakistan	1214	113	1.73	0.5323	0.5323	20.59	2.42	2.00
Peru	921	81	3.80	0.5107	0.5107	12.27	3.38	4.00
Philippines	2001	147	2.90	0.4797	0.4851	25.24	2.74	2.00
Poland	1782	181	9.93	0.4975	0.4869	44.28	2.69	2.00
Portugal	1124	107	20.82	0.5913	0.5900	29.89	2.94	2.00
Qatar	67	16	0.00	0.0000	0.0000	53.73	3.60	3.00
Russia	660	94	13.03	0.5994	0.2653	26.67	2.66	3.00
Saudi Arabia	211	54	9.00	0.3517	0.5885	27.01	2.73	3.00
Singapore	6759	640	49.65	0.6724	0.3449	59.85	2.64	2.00
Slovakia	65	19	32.31	0.7213	0.6802	15.38	2.00	2.00
Slovenia	101	12	38.61	0.3955	0.7056	54.46	2.70	2.00
South Africa	4820	571	8.55	0.5062	0.3955	27.84	2.75	2.00
South Korea	12296	1093	3.57	0.5267	0.5073	18.85	2.62	2.00
Spain	1921	181	34.93	0.4900	0.5288	39.88	2.80	2.00
Sri Lanka	299	25	17.06	0.4974	0.4909	51.17	5.49	6.00
Sweden	4736	483	39.70	0.6592	0.4974	35.14	2.57	2.00
Switzerland	3164	233	65.33	0.6579	0.6586	44.41	2.59	2.00
Taiwan	13458	1570	14.59	0.6129	0.6597	18.62	2.39	2.00
Thailand	5928	445	6.75	0.5728	0.6092	24.60	2.42	2.00
Turkey	2449	199	5.51	0.5073	0.5732	12.13	2.40	2.00
United Arab	100	23	11.00	0.9854	0.5099	22.00	3.30	3.00
United Kingdom	27693	3028	34.02	0.6054	0.5901	29.07	2.49	2.00
United States	99000	11159	21.26	0.4582	0.6101	21.62	2.32	2.00
Venezuela	228	25	7.02	0.4305	0.4581	24.12	2.15	2.00
Total	392975	38971	21.13	0.5620	0.5639	33.69	2.54	2.00

Table 3: Firm characteristics by median of cash ratio

This table provides univariate comparisons of the mean and median of variables for two subsamples: lower or higher than the median level of cash. The median cash ratio is calculated in each country for every year. The sample period is from 1990 to 2011. Each variable is defined as follows: Cash Ratio: cash and short-term investments/book value of total assets; Foreign Sales: Foreign sales/total sales; Ind. Diversification: total number of industrial segments based on two-digit SIC codes in each year; Tobinq: (book value of total assets + market value of common equity − book value of common equity)/assets; Size: natural logarithm of book value of assets in USD; NWC (net working capital): [(current assets – cash) – current liabilities]/book value of total assets; R&D: R&D/book value of total assets; Cash flow: (net income + depreciation)/book value of total assets; Leverage: book value of total long- and short-term debt/(book value of total long- and short-term debt + book value of common equity + book value of preferred stocks); Capex: capital expenditures/book value of total assets; Payer: 1 if common dividend is paid, otherwise 0; Acquisitions: net assets from acquisitions/book value of total assets; NetEquityIssues: (net proceeds from sale or issue of common and preferred stocks − stocks purchased, retired, converted, redeemed)/book value of total assets; NetDebtIssues: (long-term borrowings − reduction in long-term debt)/book value of total assets; Tangibility: plant, property, and equipment/book value of total assets. The significance of differences between means and medians is based on the t-test for the mean differences and the Wilcoxon Rank test for median differences, and ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels.

	All Sample				Above Median Cash Level			Below Median Cash Level			Differences	
Variable	N	Mean	Median	Std.Dev	N	Mean	Median	N	Mean	Median	Mean	Median
Cash Ratio	392975	0.1730	0.1054	0.1947	195644	0.2983	0.2325	197331	0.0487	0.0386	0.2496***	0.1939***
Foreign Sales	392975	0.1401	0.0000	0.2627	195644	0.1468	0.0000	197331	0.1335	0.0000	0.0133***	0.0000***
Ind. Diversification	324707	1.6157	1.0000	0.9101	160592	1.5562	1.0000	164115	1.6739	1.0000	-0.1177***	0.0000***
Tobinq	392975	1.7968	1.2511	1.4369	195644	2.0418	1.3986	197331	1.5539	1.1578	0.4880***	0.2407***
Size	392975	11.7697	11.8112	2.2161	195644	11.5123	11.5811	197331	12.0249	12.0405	-0.5127***	-0.4594***
NWC	392975	0.0105	0.0148	0.1918	195644	0.0081	0.0126	197331	0.0128	0.0173	-0.0047***	-0.0046***
R&D	392975	0.0263	0.0000	0.0957	195644	0.0399	0.0000	197331	0.0127	0.0000	0.0272***	0.0000***
CashFlow	385147	0.0059	0.0603	0.2768	191792	-0.0022	0.0637	193355	0.0140	0.0576	-0.0162***	0.0061***
Leverage	392975	0.3136	0.2761	0.2038	195644	0.2208	0.1229	197331	0.4055	0.3912	-0.1847***	-0.2684***
Capexp	371360	0.0586	0.0358	0.0714	184961	0.0553	0.0333	186399	0.0619	0.0385	-0.0066***	-0.0052***
Payer	383938	0.5153	1.0000	0.4998	191399	0.5119	1.0000	192539	0.5186	1.0000	-0.0066***	0.0000***
Acquisitions	276185	0.0152	0.0000	0.0490	137207	0.0118	0.0000	138978	0.0185	0.0000	-0.0067***	0.0000***
NetEquityIssues	326859	0.0560	0.0000	0.1415	163770	0.0796	0.0000	163089	0.0323	0.0000	0.0473***	0.0000***
NetDebt Issuues	281862	0.0085	0.0000	0.0629	139816	0.0058	0.0000	142046	0.0113	0.0000	-0.0055***	0.0000***
Tangibility	391971	0.3068	0.2665	0.2302	195022	0.2421	0.2031	196949	0.3709	0.3416	-0.1288***	-0.1385***

Table 4: Internationalization and cash holdings

This table reports pooled OLS regression results with different fixed effects included. The sample period is from 1990 to 2011. Each variable is defined as follows: The dependent variable is Cash Ratio: cash and short-term investments/book value of total assets; Multinationality is measured by two proxies: Foreign Sales: Foreign sales/total sales; MNC Dummy is 1 for firms having 25% or higher foreign sales ratio, and 0 otherwise; Ind. Diversification: total number of industrial segments based on two-digit SIC codes in each year; Tobinq: (book value of total assets + market value of common equity − book value of common equity)/assets; Size: natural logarithm of book value of assets in USD; NWC (net working capital): [(current assets – cash) – current liabilities]/book value of total assets; R&D: R&D/book value of total assets; Cash flow: (net income + depreciation)/book value of total assets; Leverage: book value of total long- and short-term debt/(book value of total long- and short-term debt + book value of common equity + book value of preferred stocks); Capex: capital expenditures/book value of total assets; Payer: 1 if common dividend is paid, otherwise 0; Acquisitions: net assets from acquisitions/book value of total assets; NetEquityIssues: (net proceeds from sale or issue of common and preferred stocks − stocks purchased, retired, converted, redeemed)/book value of total assets; NetDebtIssues: (long-term borrowings − reduction in long-term debt)/book value of total assets; Tangibility: plant, property, and equipment/book value of total assets. Robust standard errors are clustered at the firm level, and ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels.

Panel A: Internationalization is measured by foreign sales as a percentage of total sales.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Multinationality		0.013***	0.010***	0.014***	0.020***	-0.002	0.003	-0.015***
		[0.002]	[0.002]	[0.003]	[0.003]	[0.002]	[0.002]	[0.003]
Tobinq	0.020***	0.020***	0.020***	0.021***	0.014***	0.014***	0.009***	0.005***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]
Size	-0.006***	-0.006***	-0.004***	-0.001**	-0.002***	-0.002***	0.004***	-0.010***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]
NWC	-0.151***	-0.152***	-0.153***	-0.146***	-0.142***	-0.235***	-0.236***	-0.200***
	[0.003]	[0.003]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]
R&D	0.286***	0.283***	0.253***	0.268***	0.242***	0.222***	0.193***	-0.120***
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.011]	[0.012]	[0.010]
Leverage	-0.256***	-0.256***	-0.264***	-0.266***	-0.250***	-0.241***	-0.237***	-0.125***
	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]	[0.002]	[0.003]	[0.003]
CashFlow			-0.043***				0.055***	0.039***
			[0.004]				[0.004]	[0.004]
Capexp			-0.309***				-0.046***	-0.080***
			[0.007]				[0.007]	[0.007]
Payer				-0.043***			-0.027***	0.008***
				[0.002]			[0.001]	[0.001]
Acquisitions				-0.229***			-0.462***	-0.309***
				[0.007]			[0.008]	[0.007]
NetEquityIssues					0.253***		0.267***	0.209***
					[0.005]		[0.005]	[0.004]
NetDebt Issuues					0.035***		0.161***	0.129***
					[0.006]		[0.007]	[0.005]
Tangibility						-0.276***	-0.272***	-0.356***
						[0.003]	[0.003]	[0.006]
Fixed effects								
Country	X	X	X	X	X	X	X	
Year	X	X	X	X	X	X	X	X
Firm								X

Panel A continues

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.191***	0.197***	0.179***	0.154***	0.151***	0.277***	0.224***	0.431***
	[0.008]	[0.008]	[0.009]	[0.010]	[0.010]	[0.008]	[0.011]	[0.012]
Adjusted R-sq	0.289	0.289	0.307	0.304	0.316	0.376	0.411	0.732
Observations	392975	392975	368368	271079	279629	391971	258813	258813
1992	-0.002*	-0.003**	-0.003*	0	0.001	0	0.001	0.002
1993	-0.004**	-0.004***	-0.003*	-0.001	0.001	0	0.001	0.004**
1994	0	-0.001	0.002	0.003*	0.003	0.001	0	0.001
1995	-0.003*	-0.003**	0.001	0.002	0.002	-0.003**	-0.003*	-0.002
1996	0.004**	0.004**	0.012***	0.012***	0.009***	0.003**	0.003*	0.002
1997	0.005***	0.005***	0.013***	0.012***	0.012***	0.003*	0.007***	0.004**
1998	-0.003	-0.003*	0.003*	0.004*	0.005**	-0.006***	0	0.002
1999	-0.002	-0.003*	-0.001	0	0.004*	-0.006***	-0.006***	-0.001
2000	0.010***	0.010***	0.013***	0.016***	0.014***	0.001	-0.002	-0.002
2008	0.022***	0.020***	0.022***	0.024***	0.029***	0	0	-0.005*
2009	0.020***	0.019***	0.017***	0.018***	0.032***	0.002	0.003	0.002
2010	0.021***	0.020***	0.018***	0.020***	0.030***	0.002	0.001	0
2011	0.024***	0.023***	0.022***	0.022***	0.030***	0.003	-0.001	-0.002

Panel B: Internationalization is measured by dummy variable for foreign sales higher than 25% of sales

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Multinationality		0.007***	0.005***	0.008***	0.011***	-0.003**	0.000	-0.008***
		[0.001]	[0.001]	[0.002]	[0.002]	[0.001]	[0.001]	[0.002]
Tobinq	0.020***	0.020***	0.020***	0.021***	0.014***	0.014***	0.009***	0.005***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]
Size	-0.006***	-0.006***	-0.003***	-0.001**	-0.002***	-0.001***	0.004***	-0.010***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]
NWC	-0.151***	-0.152***	-0.153***	-0.146***	-0.142***	-0.235***	-0.235***	-0.200***
	[0.003]	[0.003]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]
R&D	0.286***	0.284***	0.253***	0.269***	0.243***	0.223***	0.194***	-0.120***
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.011]	[0.012]	[0.010]
Leverage	-0.256***	-0.256***	-0.264***	-0.266***	-0.250***	-0.241***	-0.237***	-0.125***
	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]	[0.002]	[0.003]	[0.003]
CashFlow			-0.043***				0.055***	0.039***
			[0.004]				[0.004]	[0.004]
Capexp			-0.309***				-0.046***	-0.080***
			[0.007]				[0.007]	[0.007]
Payer				-0.043***			-0.027***	0.008***
				[0.002]			[0.001]	[0.001]
Acquisitions				-0.229***			-0.461***	-0.308***
				[0.007]			[0.008]	[0.007]
NetEquityIssues					0.253***		0.266***	0.209***
					[0.005]		[0.005]	[0.004]
NetDebt Issuues					0.035***		0.161***	0.129***
					[0.006]		[0.007]	[0.006]
Tangibility						-0.276***	-0.272***	-0.356***
						[0.003]	[0.003]	[0.006]
Fixed effects								
Country	X	X	X	X	X	X	X	
Year	X	X	X	X	X	X	X	X
Firm								X
Constant	0.191***	0.196***	0.178***	0.153***	0.150***	0.275***	0.223***	0.432***
	[0.008]	[0.008]	[0.009]	[0.010]	[0.010]	[0.008]	[0.011]	[0.012]
Adjusted R-sq	0.289	0.289	0.307	0.304	0.315	0.376	0.411	0.732
Observations	392975	392975	368368	271079	279629	391971	258813	258813
1992	-0.002*	-0.003**	-0.003*	0	0.001	0	0.001	0.002
1993	-0.004**	-0.004***	-0.003*	-0.001	0.001	0	0.001	0.003**
1994	0	-0.001	0.002	0.003*	0.003	0.001	0	0.001
1995	-0.003*	-0.003*	0.001	0.002	0.002	-0.003**	-0.003*	-0.002
1996	0.004**	0.004**	0.012***	0.012***	0.009***	0.003**	0.003*	0.002
1997	0.005***	0.005***	0.013***	0.013***	0.012***	0.003*	0.007***	0.004**
1998	-0.003	-0.003*	0.003*	0.004*	0.005**	-0.006***	0.001	0.002
1999	-0.002	-0.003	-0.001	0.001	0.004**	-0.006***	-0.006***	-0.001
2000	0.010***	0.010***	0.014***	0.016***	0.014***	0.001	-0.002	-0.002
2008	0.022***	0.021***	0.022***	0.024***	0.030***	0	0	-0.005*
2009	0.020***	0.020***	0.018***	0.019***	0.032***	0.002	0.003	0.002
2010	0.021***	0.020***	0.018***	0.020***	0.031***	0.002	0.001	0
2011	0.024***	0.023***	0.023***	0.022***	0.030***	0.003	0	-0.003

Table 5: Internationalization, industrial diversification, and cash holdings

This table reports pooled OLS regression results with firm and year fixed effects. The sample period is from 1990 to 2011. Each variable is defined as follows: The dependent variable is Cash Ratio: cash and short-term investments/book value of total assets; Multinationality is measured by two proxies: Foreign Sales: Foreign sales/total sales; MNC Dummy is 1 for firms having 25% or higher foreign sales ratio, and 0 otherwise; Ind. Diversification: total number of industrial segments based on two-digit SIC codes in each year; Tobinq: (book value of total assets + market value of common equity − book value of common equity)/assets; Size: natural logarithm of book value of assets in USD; NWC (net working capital): [(current assets – cash) – current liabilities]/book value of total assets; R&D: R&D/book value of total assets; Cash flow: (net income + depreciation)/book value of total assets; Leverage: book value of total long- and short-term debt/(book value of total long- and short-term debt + book value of common equity + book value of preferred stocks); Capex: capital expenditures/book value of total assets; Payer: 1 if common dividend is paid, otherwise 0; Acquisitions: net assets from acquisitions/book value of total assets; NetEquityIssues: (net proceeds from sale or issue of common and preferred stocks − stocks purchased, retired, converted, redeemed)/book value of total assets; NetDebtIssues: (long-term borrowings − reduction in long-term debt)/book value of total assets; Tangibility: plant, property, and equipment/book value of total assets. Robust standard errors are clustered at the firm level and ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels.

	Foreign Sales			MNC Dummy		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Multinationality	-0.015***	-0.015***	-0.027***	-0.008***	-0.007***	-0.015***
	[0.003]	[0.003]	[0.005]	[0.002]	[0.002]	[0.003]
Ind. Diversification		-0.003***	-0.004***		-0.003***	-0.004***
		[0.001]	[0.001]		[0.001]	[0.001]
Multinationality × Ind. Diversification			0.008***			0.005***
			[0.002]			[0.001]
Tobinq	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Size	-0.010***	-0.009***	-0.009***	-0.010***	-0.009***	-0.009***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
NWC	-0.200***	-0.194***	-0.194***	-0.200***	-0.194***	-0.194***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
R&D	-0.120***	-0.118***	-0.118***	-0.120***	-0.118***	-0.118***
	[0.010]	[0.011]	[0.011]	[0.010]	[0.011]	[0.011]
Leverage	-0.125***	-0.119***	-0.119***	-0.125***	-0.119***	-0.119***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
CashFlow	0.039***	0.040***	0.040***	0.039***	0.040***	0.040***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Capexp	-0.080***	-0.085***	-0.085***	-0.080***	-0.085***	-0.085***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
Payer	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Acquisitions	-0.309***	-0.306***	-0.306***	-0.308***	-0.306***	-0.306***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]
NetEquityIssues	0.209***	0.206***	0.206***	0.209***	0.206***	0.206***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
NetDebt Issuues	0.129***	0.133***	0.133***	0.129***	0.133***	0.133***
	[0.005]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
Tangibility	-0.356***	-0.352***	-0.352***	-0.356***	-0.352***	-0.352***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]

Table 5 continues

Constant	0.431***	0.417***	0.420***	0.432***	0.418***	0.420***
	[0.012]	[0.013]	[0.013]	[0.012]	[0.013]	[0.013]
Adjusted R-sq	0.732	0.741	0.741	0.732	0.741	0.741
Observations	258813	221489	221489	258813	221489	221489
1992	0.002	0.003*	0.003*	0.002	0.003*	0.003
1993	0.004**	0.005**	0.005**	0.003**	0.005**	0.005**
1994	0.001	0.002	0.002	0.001	0.002	0.002
1995	-0.002	0	0	-0.002	0	0
1996	0.002	0.003	0.003	0.002	0.003	0.002
1997	0.004**	0.005**	0.005**	0.004**	0.005**	0.005**
1998	0.002	0.003	0.003	0.002	0.003	0.002
1999	-0.001	-0.002	-0.002	-0.001	-0.002	-0.002
2000	-0.002	-0.001	-0.001	-0.002	-0.002	-0.002
2008	-0.005*	-0.005*	-0.005*	-0.005*	-0.006*	-0.006*
2009	0.002	0.001	0.001	0.002	0	0
2010	0	-0.001	-0.001	0	-0.001	-0.001
2011	-0.002	-0.003	-0.004	-0.003	-0.004	-0.004

Table 6: Internationalization, industrial diversification, and cash holdings in developed and emerging markets

This table reports pooled OLS regression results with firm and year fixed effects. The dependent variable is Cash Ratio: cash and short-term investments/book value of total assets. The definitions of other variables are given on Table 5. Robust standard errors are clustered at the firm level and ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels.

	DEVELOPED MARKETS						EMERGING MARKETS					
	Foreign Sales			MNC Dummy			Foreign Sales			MNC Dummy		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Multinationality	-0.022***	-0.020***	-0.035***	-0.011***	-0.010***	-0.020***	0.016***	0.015***	0.014*	0.008***	0.008***	0.007
	[0.003]	[0.004]	[0.006]	[0.002]	[0.002]	[0.003]	[0.004]	[0.005]	[0.008]	[0.002]	[0.002]	[0.004]
Industrial		-0.004***	-0.007***		-0.004***	-0.006***		-0.001	-0.001		-0.001	-0.001
		[0.001]	[0.001]		[0.001]	[0.001]		[0.001]	[0.001]		[0.001]	[0.001]
Multinationality × Ind. Diversification			0.010***			0.006***			0			0.001
			[0.003]			[0.001]			[0.003]			[0.002]
Tobinq	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Size	-0.011***	-0.009***	-0.009***	-0.011***	-0.009***	-0.009***	0	-0.001	-0.001	0	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
NWC	-0.196***	-0.188***	-0.188***	-0.196***	-0.188***	-0.188***	-0.208***	-0.211***	-0.211***	-0.208***	-0.211***	-0.211***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.008]	[0.009]	[0.009]	[0.008]	[0.009]	[0.009]
R&D	-0.120***	-0.117***	-0.117***	-0.120***	-0.117***	-0.117***	-0.093	-0.131	-0.131	-0.091	-0.129	-0.129
	[0.010]	[0.011]	[0.011]	[0.010]	[0.011]	[0.011]	[0.060]	[0.094]	[0.094]	[0.059]	[0.094]	[0.094]
Leverage	-0.126***	-0.119***	-0.119***	-0.126***	-0.119***	-0.119***	-0.119***	-0.117***	-0.117***	-0.119***	-0.117***	-0.117***
	[0.003]	[0.004]	[0.004]	[0.003]	[0.004]	[0.004]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]
Cashflow	0.034***	0.035***	0.035***	0.034***	0.035***	0.035***	0.094***	0.096***	0.096***	0.094***	0.096***	0.095***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.008]	[0.009]	[0.009]	[0.008]	[0.009]	[0.009]
Capexp	-0.078***	-0.082***	-0.083***	-0.078***	-0.082***	-0.082***	-0.062***	-0.073***	-0.073***	-0.062***	-0.073***	-0.073***
	[0.008]	[0.009]	[0.009]	[0.008]	[0.009]	[0.009]	[0.009]	[0.011]	[0.011]	[0.009]	[0.011]	[0.011]
Payer	0.006***	0.007***	0.007***	0.006***	0.007***	0.007***	0.012***	0.013***	0.013***	0.012***	0.013***	0.013***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Acquisitions	-0.313***	-0.311***	-0.311***	-0.313***	-0.311***	-0.311***	-0.241***	-0.222***	-0.222***	-0.240***	-0.221***	-0.221***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.020]	[0.022]	[0.022]	[0.020]	[0.022]	[0.022]
NetEquityIssues	0.207***	0.204***	0.204***	0.207***	0.205***	0.204***	0.186***	0.184***	0.184***	0.186***	0.184***	0.184***
	[0.004]	[0.005]	[0.005]	[0.004]	[0.005]	[0.005]	[0.010]	[0.012]	[0.012]	[0.010]	[0.012]	[0.012]
NetDebt Issues	0.131***	0.133***	0.133***	0.131***	0.133***	0.133***	0.122***	0.132***	0.132***	0.122***	0.132***	0.132***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.008]	[0.009]	[0.009]	[0.008]	[0.009]	[0.009]
Tangibility	-0.385***	-0.376***	-0.376***	-0.385***	-0.376***	-0.376***	-0.257***	-0.255***	-0.255***	-0.257***	-0.255***	-0.255***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.009]	[0.010]	[0.010]	[0.009]	[0.010]	[0.010]

Table 6 continues

Constant	0.460***	0.439***	0.443***	0.460***	0.440***	0.443***	0.226***	0.237***	0.237***	0.225***	0.236***	0.236***
	[0.013]	[0.015]	[0.015]	[0.013]	[0.015]	[0.015]	[0.026]	[0.025]	[0.025]	[0.026]	[0.025]	[0.025]
Adjusted R-sq	0.733	0.742	0.742	0.732	0.742	0.742	0.693	0.709	0.709	0.693	0.709	0.709
Observations	200185	178164	178164	200185	178164	178164	58389	43099	43099	58389	43099	43099
1992.year	0.002*	0.004*	0.003*	0.002	0.004*	0.003*	0.005	0.001	0.001	0.005	0.001	0.001
1993.year	0.004**	0.005***	0.005**	0.004**	0.005**	0.005**	0.012**	0.006	0.006	0.012**	0.006	0.006
1994.year	0.001	0.002	0.001	0.001	0.001	0.001	0.013**	0.01	0.01	0.013**	0.01	0.01
1995.year	-0.002	-0.001	-0.002	-0.002	-0.001	-0.002	0.011**	0.011	0.011	0.011**	0.01	0.01
1996.year	0.002	0.002	0.002	0.002	0.002	0.002	0.014***	0.012*	0.012*	0.014***	0.012*	0.012*
1997.year	0.004**	0.005*	0.005*	0.004*	0.005*	0.004*	0.018***	0.018**	0.018**	0.018***	0.017**	0.017**
1998.year	0.001	0.001	0.001	0	0.001	0	0.022***	0.023***	0.023***	0.022***	0.023***	0.023***
1999.year	-0.004*	-0.005**	-0.006**	-0.005*	-0.006**	-0.006**	0.025***	0.026***	0.026***	0.026***	0.026***	0.026***
2000.year	-0.006**	-0.005*	-0.005*	-0.006**	-0.005*	-0.006**	0.027***	0.028***	0.028***	0.027***	0.028***	0.028***
2008.year	-0.010***	-0.010***	-0.010***	-0.011***	-0.011***	-0.011***	0.022***	0.022***	0.022***	0.022***	0.022***	0.022***
2009.year	-0.003	-0.004	-0.004	-0.004	-0.005	-0.005	0.028***	0.029***	0.029***	0.028***	0.029***	0.029***
2010.year	-0.006*	-0.007*	-0.007**	-0.007**	-0.008**	-0.008**	0.027***	0.029***	0.029***	0.028***	0.030***	0.029***
2011.year	-0.008**	-0.008**	-0.009**	-0.009**	-0.010***	-0.010***	0.021***	0.023***	0.023***	0.022***	0.023***	0.023***

Table 7: Alternative tests

This table reports core results from pooled OLS regression results with firm and year fixed effects. The estimated coefficients of all other independent variables are not reported to save space. The dependent variable is Cash Ratio: cash and short-term investments/book value of total assets; Multinationality is measured by two proxies: Foreign Sales: Foreign sales/total sales; MNC Dummy is 1 for firms having 25% or higher foreign sales ratio, and 0 otherwise; Diversification Dummy takes the value of 1 for firms having more than one (Panel A) and more than two (Panel B) product segments based on two-digit SIC codes, and 0 otherwise. Ind. Diversification: total number of industrial segment based on two-digit SIC codes in each year. Robust standard errors are clustered at the firm level and ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels.

Panel A: Industrial diversification is measured by dummy with more than one segment

	All		Developed		Emerging	
	Foreign Sales	MNC Dummy	Foreign Sales	MNC Dummy	Foreign Sales	MNC Dummy
Multinationality	-0.020***	-0.009***	-0.026***	-0.011***	0.014**	0.007**
	[0.004]	[0.002]	[0.004]	[0.002]	[0.006]	[0.003]
Diversification Dummy	-0.008***	-0.007***	-0.011***	-0.009***	-0.003	-0.003
	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]
Multinationality × Diversification Dummy	0.016***	0.010***	0.018***	0.010**	0.002	0.005
	[0.004]	[0.004]	[0.005]	[0.004]	[0.007]	[0.007]
Adjusted R-sq	0.741	0.741	0.742	0.742	0.709	0.709
Observations	221490	221490	178165	178165	43325	43325

Panel B: Industrial diversification is measured by dummy with more than two segments

	All		Developed		Emerging	
	Foreign Sales	MNC Dummy	Foreign Sales	MNC Dummy	Foreign Sales	MNC Dummy
Multinationality	-0.016***	-0.007***	-0.022***	-0.010***	0.014***	0.008***
	[0.003]	[0.002]	[0.004]	[0.002]	[0.005]	[0.003]
Diversification Dummy	-0.008***	-0.007***	-0.011***	-0.010***	-0.003	-0.003
	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]
Multinationality × Diversification Dummy	0.012**	0.009*	0.014**	0.010*	0.002	0.004
	[0.005]	[0.005]	[0.006]	[0.006]	[0.009]	[0.009]
Adjusted R-sq	0.741	0.741	0.742	0.742	0.709	0.709
Observations	221490	221490	178165	178165	43325	43325

Panel C: Firms with less than 10 million USD market capitalization is excluded

	All		Developed		Emerging	
	Foreign Sales	MNC Dummy	Foreign Sales	MNC Dummy	Foreign Sales	MNC Dummy
Multinationality	-0.020***	-0.012***	-0.028***	-0.016***	0.017**	0.008*
	[0.005]	[0.003]	[0.006]	[0.003]	[0.008]	[0.004]
Ind. Diversification	-0.004***	-0.004***	-0.005***	-0.005***	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Multinationality × Ind. Diversification	0.007***	0.004***	0.008***	0.005***	0.001	0.001
	[0.002]	[0.001]	[0.003]	[0.001]	[0.003]	[0.002]
Adjusted R-sq	0.785	0.785	0.79	0.79	0.72	0.72
Observations	193046	193046	155146	155146	37900	37900